TOWN OF FREMONT, NH
HAZARD MITIGATION PLAN UPDATE 2015

Approved by the

FREMONT, NH
BOARD OF SELECTMEN

And adopted as an official appendix to the
Fremont, NH Emergency Operations Plan

_____, 2015

ROCKINGHAM
PLANNING
COMMISSION

This project was partially funded by

NEW HAMPSHIRE HOMELAND SECURITY AND EMERGENCY MANAGEMENT

CERTIFICATE OF ADOPTION

Town of Fremont, New Hampshire
Board of Selectmen
A Resolution Adopting the Fremont Hazard Mitigation Plan Update
_____, 2015

WHEREAS, the Town of Fremont received funding from the NH Division of Homeland Security and Emergency Management under a Pre-Disaster Mitigation Grant and assistance from Rockingham Planning Commission in the preparation of the Fremont Hazard Mitigation Plan Update; and

WHEREAS, several public planning meetings were held between March 2015 and October 2015 regarding the development and review of the Fremont Hazard Mitigation Plan Update 2015; and

WHEREAS, the Fremont Hazard Mitigation Plan Update 2015 contains several potential future projects to mitigate hazard damage in the Town of Fremont; and

WHEREAS, a duly-noticed public hearing was held by the Fremont Board of Selectmen on _____, 2015 to formally approve and adopt the Fremont Hazard Mitigation Plan Update 2015.

NOW, THEREFORE BE IT RESOLVED that the Fremont Board of Selectmen adopts the Fremont Hazard Mitigation Plan Update.

ADOPTED AND SIGNED this ____ day of _____, 2015.

_____

Fremont Board of Selectmen Chair

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ATTEST

_____
Public Notary

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EXECUTIVE SUMMARY

The Fremont Hazard Mitigation Plan Update 2015 (herein after, the *Plan*) was compiled to assist the Town of Fremont in reducing and mitigating future losses from natural hazard events. The *Plan* was developed by the Rockingham Planning Commission and participants from the Town of Fremont and contains the tools necessary to identify specific hazards and aspects of existing and future mitigation efforts.

The following hazards are addressed:

- Flooding
- Hurricane
- Tornado
- Severe Winter Weather
- Wildfire
- Earthquake
- Extreme Heat

The Critical Facilities include but are not limited to:

- Public Safety Complex
- Town Hall

The *Plan* is considered a work in progress and should be revisited frequently to assess whether the existing and suggested mitigation strategies are successful. Copies have been distributed to the Town of Fremont, and a copy will remain on file at the Rockingham Planning Commission. A copy of this Plan will be on file at New Hampshire Homeland Security and Emergency Management (NHHSEM) and the Federal Emergency Management Agency (FEMA). Upon approval by both agencies the town shall adopt the plan update.

CHAPTER 1 – INTRODUCTION

BACKGROUND

The New Hampshire Homeland Security Emergency Management (NHHSEM) has a goal for all communities within the State of New Hampshire to establish local hazard mitigation plans as a means to reduce and mitigate future losses from natural hazard events. The NHHSEM outlined a process whereby communities throughout the State may be eligible for grants and other assistance upon completion of a local hazard mitigation plan. A handbook entitled *Hazard Mitigation Planning for New Hampshire Communities* was created by NHHSEM to assist communities in developing local plans. The State's Regional Planning Commissions are charged with providing assistance to selected communities to develop local plans.

The *Fremont Hazard Mitigation Plan Update 2015* was prepared by participants from the Town of Fremont Hazard Mitigation Team with the assistance and professional services of the Rockingham Planning Commission (RPC) under contract with the New Hampshire Homeland Security and Emergency Management (NHHSEM) operating under the guidance of Section 44 CFR 201.6. The *Fremont Hazard Mitigation Plan* serves as a strategic planning tool for use by the Town of Fremont in its efforts to identify and mitigate the future impacts of natural and/or man-made hazard events. Upon adoption of the *Plan* by the Fremont Board of Selectmen, the *Plan* will be consulted by the Planning Board and other municipal boards involved with land use planning and disaster preparedness.

METHODOLOGY

The Rockingham Planning Commission (RPC) organized the first meeting with emergency management officials from the Town of Fremont in April 2014 to begin the initial planning stages of the *Plan.* RPC and participants from the Town developed the content of the *Plan* using the ten-step process set forth in the *Hazard Mitigation Planning for New Hampshire Communities* during the initial meeting and subsequent meetings held on March 17, 2015, April 16, 2015, May 21, 2015, June 10, 2015, October 27, 2015additional dates to be added. Public and stakeholder involvement was stressed during the initial meeting and community officials were urged to contact as many people as they could to participate in the planning process, including not only residents by also officials and residents from surrounding communities. General announcements about the planning process were posted in the Town Hall and on the Town website. In addition, RPC staff kept communities in the region informed of the Fremont Plan Update process at monthly Commission meetings. The following is a summary of the ten-step process conducted to compile the *Plan.*

Step 1 – Form Committee

A Committee comprised of the EMD, Fire Chief, Police Chief and Road Agent, Town Administrator, member of the Board of Selectmen, and the Administrative Assistant to the Planning Board was established to work with staff from the Rockingham Planning Commission to update the Plan. Public notices, per NH RSA 91-A:2 (II) and pursuant to CFR 201.6(b)(1) were posted on the town website and viewing sites including the Town Offices to inform residents about the planning process, to participate, and possibly

become a member of the planning process. The initial meeting was held in March 2015 to introduce the Mitigation Planning process to committee members and to set up future meeting times. Participation was sought from the NH Homeland Security and Emergency Management and staff from the Division attended planning meetings and reviewed and commented on the Plan.

Step 2 – Map the Hazards

The Committee identified areas where damage from historic natural disasters have occurred and areas where critical man-made facilities and other features may be at risk in the future for loss of life, property damage, environmental pollution and other risk factors. RPC generated a set of base maps with GIS (Geographic Information Systems) that were used in the process of identifying past and future hazards.

Step 3 – Identify Critical Facilities and Areas of Concern

The Committee then identified facilities and areas that were considered to be important to the Town for emergency management purposes, for provision of utilities and community services, evacuation routes, and for recreational and social value. Using aerial photography, RPC plotted the exact location of these sites on a map. Digital images were collected for each Critical Facility using Pictometry^{tm} software and images of the Town of Fremont.

Step 4 – Identify Existing Mitigation Strategies

After collecting detailed information on each critical facility in Fremont, the Committee and RPC staff identified existing town mitigation strategies relative to flooding, wind, fire, ice and snow events, extreme temperatures, and earthquakes. This process involved reviewing the 2009 Hazard Mitigation Plan, the Town's Master Plan and Capital Improvements Program (CIP), Zoning Ordinance, Subdivision Regulations, Site Plan Review Regulations, 2009 Exeter River Fluvial Geomorphic Assessment, 2015 Regional Stream Crossing Assessment, and participation in the National Flood Insurance Program (NFIP). This allowed the committee to identify portions of the Town's existing mitigation strategies. The Committee could review how natural hazards were examined in other town documents, which allowed the committee to review how prepared the town was for Natural Disasters.

Step 5 – Identify the Gaps in Existing Mitigation Strategies

The existing strategies were then reviewed by the RPC and the Committee for coverage and effectiveness, as well as the need for improvement.

Step 6 – Identify Potential Mitigation Strategies

A list was developed of additional hazard mitigation actions and strategies for the Town of Fremont. Natural Hazard Mitigation Plans for other communities in the region were utilized to identify new mitigation strategies as well as FEMA recommended hazard

mitigation examples. The Master Plan, Emergency Operation Plan, and Capital Improvements Plan were also reviewed to generate ideas.

Step 7 – Prioritize and Develop the Action Plan

The proposed hazard mitigation actions and strategies were reviewed and each strategy was rated (good, average, or poor) for its effectiveness according to several factors (*e.g.*, technical and administrative applicability, political and social acceptability, legal authority, environmental impact, financial feasibility). Each factor was then scored and all scores were totaled for each strategy. Strategies were ranked by overall score for preliminary prioritization then reviewed again under Step 8.

Step 8 - Determine Priorities

The preliminary prioritization list was reviewed in order to make changes and determine a final prioritization for new hazard mitigation actions and existing protection strategy improvements identified in previous steps. RPC also presented recommendations to be reviewed and prioritized by emergency management officials.

Step 9 - Develop Implementation Strategy

Using the chart provided under Step 9 in the handbook, an implementation strategy was created which included person(s) responsible for implementation (who), a timeline for completion (when), and a funding source and/or technical assistance source (how) for each identified hazard mitigation actions.

Step 10 - Adopt and Monitor the *Plan*

RPC staff compiled the results of Steps 1 to 9 in a draft document. This draft *Plan* was reviewed by members of the Committee and by staff members at the RPC. The draft *Plan* was also placed on the Town website for review by the public, neighboring communities, agencies, businesses, and other interested parties to review and make comments via email. Per NH RSA 91-A:2 (II) and pursuant to CFR 201.6(b)(1) a duly noticed public meeting was held by the Fremont Board of Selectmen on November 12, 2015. The meeting allowed the community and neighboring towns to provide comments and suggestions for the Plan in person, prior to the document being finalized. This review also allowed board and committee members to review other planning documents in town such as the Master Plan and CIP to consider and incorporate pertinent information that may be included within the Hazard Mitigation Plan. After public comment was accepted, the draft was revised to incorporate comments from the Selectmen, Planning Board and general public; then submitted to the NHHSEM and FEMA Region I for their review and comments. Any changes required by NHHSEM and FEMA were made and a revised draft document was then submitted to the Fremont Board of Selectmen for their final review. A public hearing was then held by the Fremont Board of Selectmen on (date to be determined). At this public hearing the Plan update was approved and adopted by the Board of Selectman.

HAZARD MITIGATION GOALS AND OBJECTIVES OF THE STATE OF NEW HAMPSHIRE

The Town of Fremont sets forth the following hazard mitigation goals and objectives:

- Ensure the protection of the general population, citizens and guests of the State of New Hampshire, before, during and after a hazard.

- Protect existing properties and structures through mitigation activities.

- Provide resources to residents of New Hampshire to become more resilient to hazards that impact the State's Critical Support Services, Critical Facilities, Infrastructure, Economy, Environment, Historical and Cultural Treasures and Private Property.

- Support the Presidential Policy Directive (PPD-8) through prevention, mitigation, preparedness, response and recovery actions in all New Hampshire communities.

- Work regionally to identify, introduce and implement cost effective Hazard Mitigation measures in order to accomplish the State's Goals.

- Develop and implement programs to promote hazard mitigation to protect infrastructure throughout the State to reduce the State's liability with respect to natural and Human-caused hazards generally.

- To address the challenges posed by climate change as they pertain to increasing risks in the State's infrastructure and natural environment

Through the adoption of this Plan Update the Town of Fremont concurs and adopts these goals and objectives.

ACKNOWLEDGEMENTS

The Fremont Board of Selectmen extends special thanks to those that assisted in the development of this Plan update by serving as member of Natural Hazards Mitigation Committee:.

Heidi Carlson - Town Administrator, Town of Fremont, NH
Bob Meade - Building Inspector, Town of Fremont, NH
Meredith Bolduc – Land Use Administrative Assistant, Town of Fremont, NH
Leon Holmes, Jr. – Highway Department, Town of Fremont, NH
Leon Holmes, Sr. – Board of Selectmen, Town of Fremont, NH
Joseph Nichols – Deputy Fire Chief, Town of Fremont, NH
Ellen Arcieri – Police Department, Town of Fremont, NH
Jeanne Nygen – Town Clerk, Town of Fremont, NH

The Fremont Board of Selectmen offers thanks to the NHHSEM (http://www.nh.gov/safety/divisions/hsem/index.html) which provided the model and funding for this Plan.

In addition, thanks are extended to the staff of the Rockingham Planning Commission for professional services, process facilitation and preparation of this document.

CHAPTER II – COMMUNITY PROFILE

NATURAL FEATURES

Fremont is a rural community in southeastern New Hampshire. According to the 2010 US Census, the population in 2010 was 4,283. The town is characterized by winding roads, fields and forest, the Exeter River and a pastoral landscape. Fremont is approximately 17 square miles (11,142 acres) with 0.2 square miles of surface water. The highest point is a hill on the western side of town with an elevation of 322 feet above sea level.

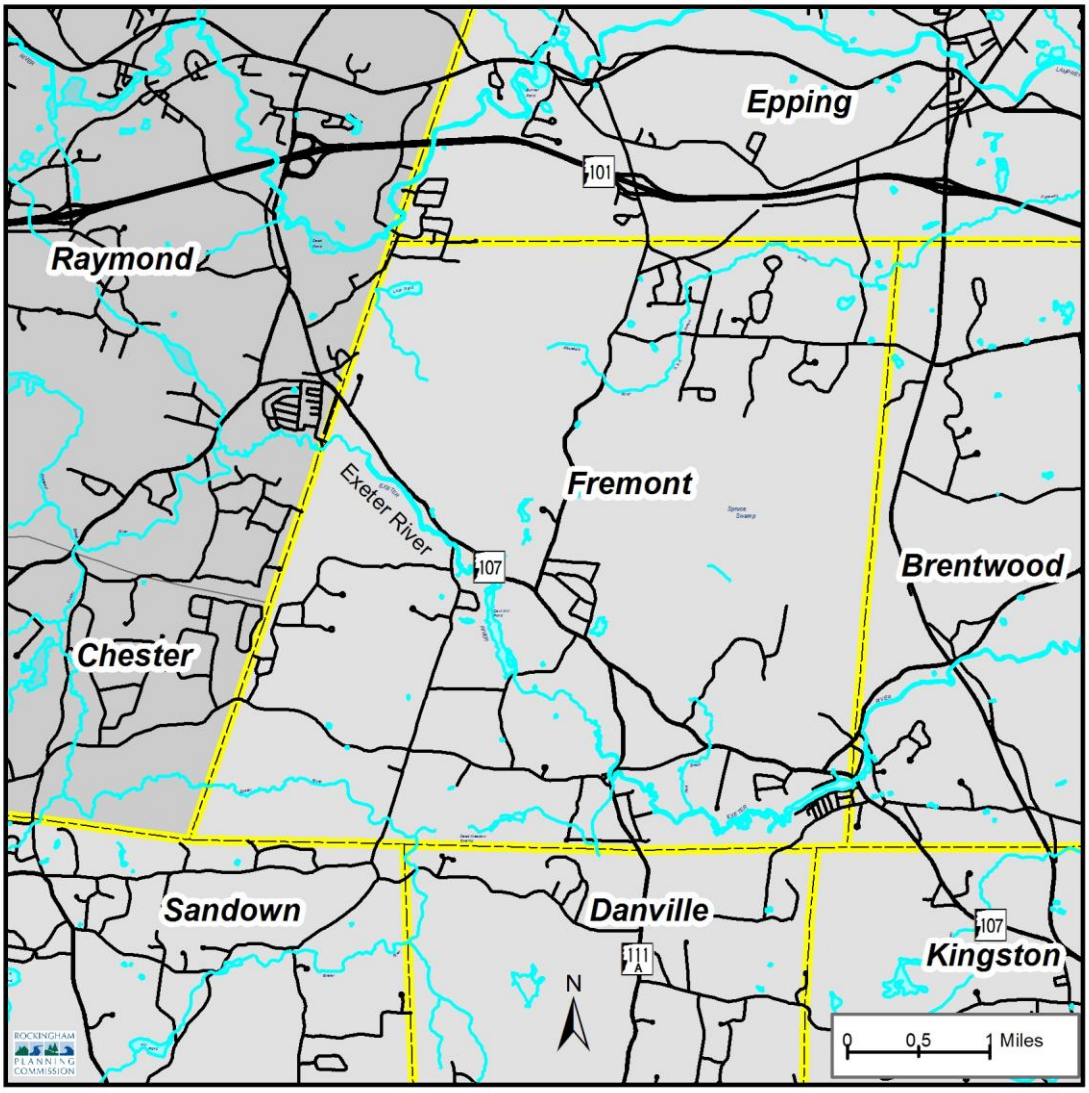

Figure 1: Location Map of Fremont, New Hampshire

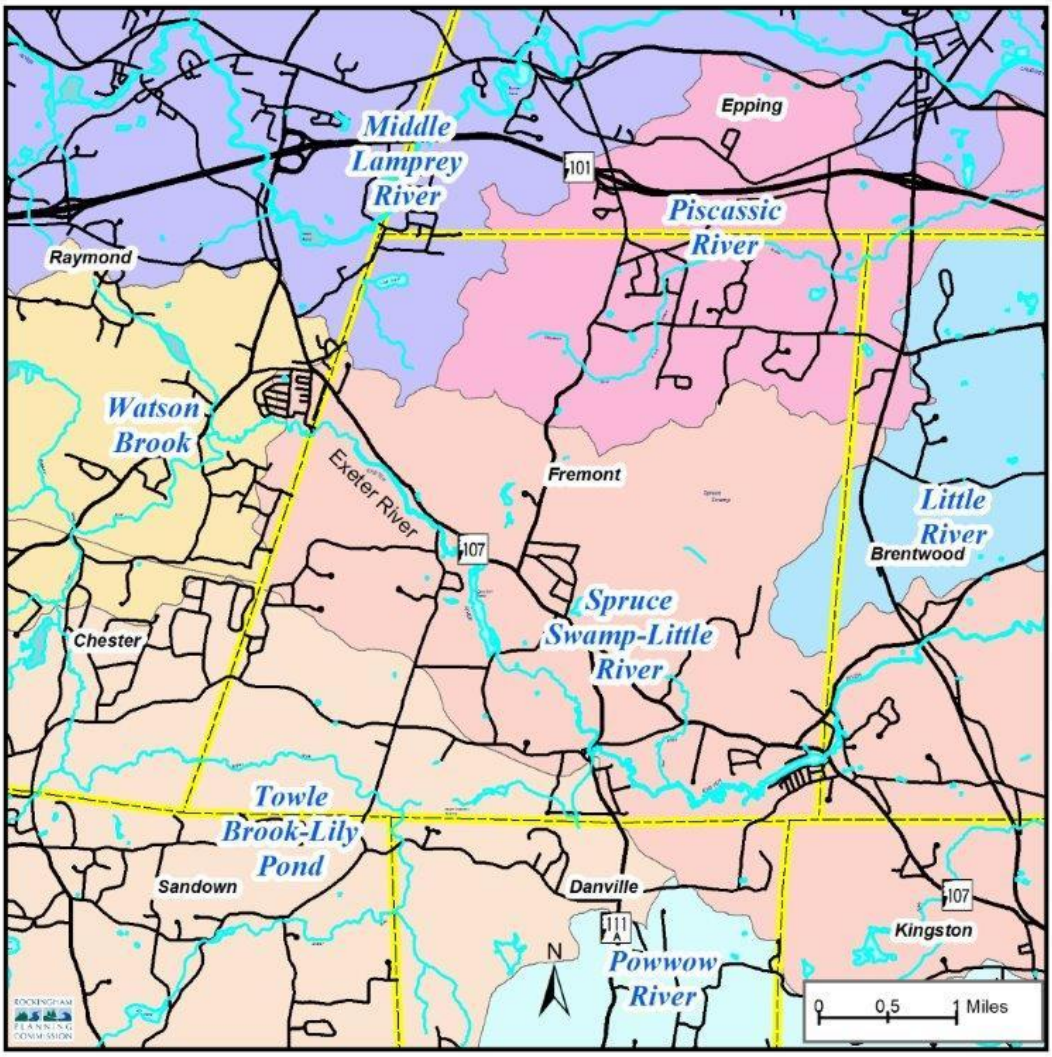

Figure 2: Watershed Map of Fremont, New Hampshire

Fremont is part of the Exeter River watershed and the Piscassic River watershed. Both rivers are part of the Great Bay Estuary watershed, which flows into the Atlantic Ocean. The Exeter River flows west to east across the southern portion of Fremont. The Exeter River watershed encompasses 8,155 acres in Fremont, or 73% of the town. The Piscassic River flows from west to east across the northern portion of Fremont. The Piscassic River watershed encompasses approximately 2,984 acres, or 27% of town.

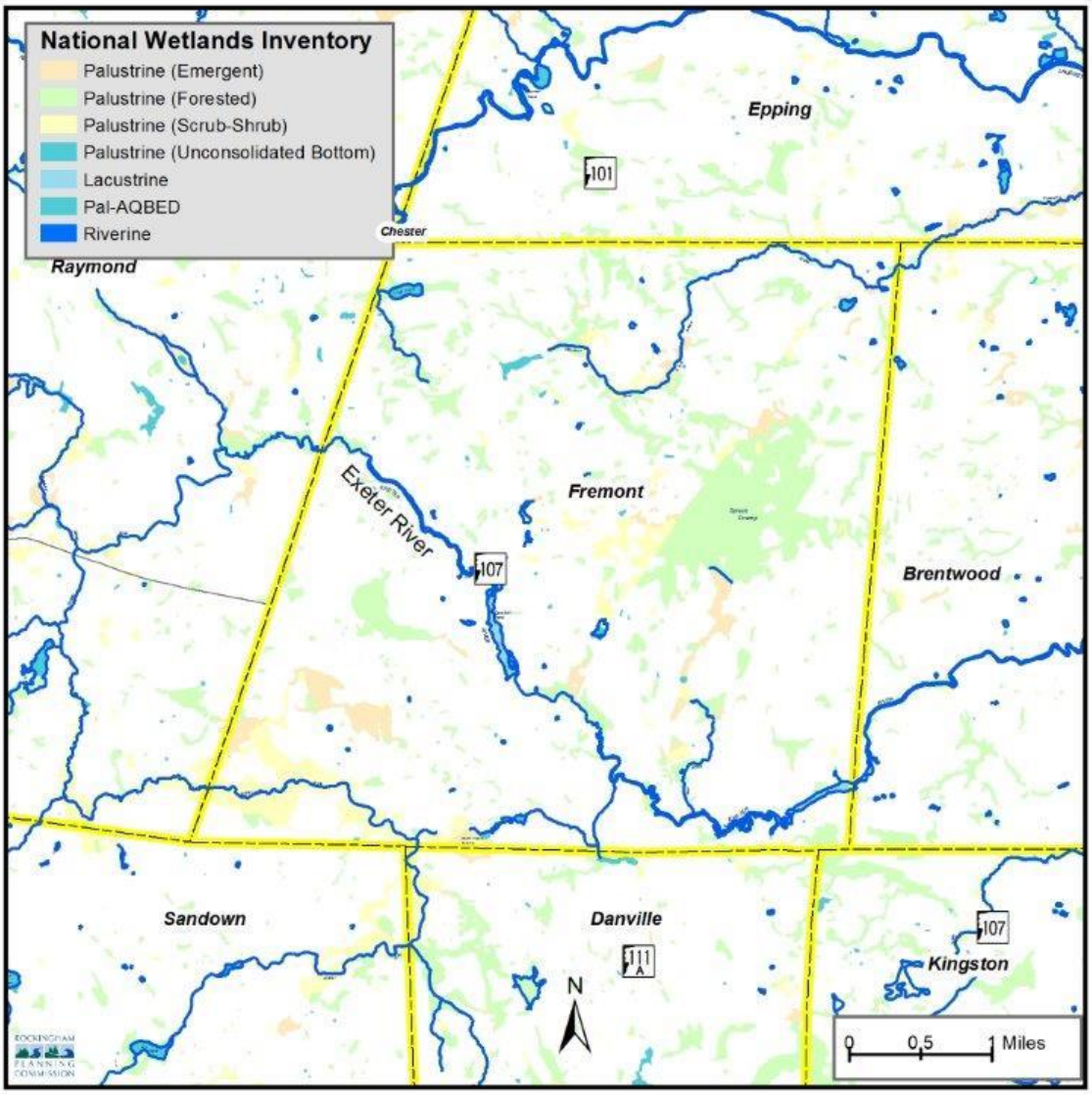

Figure 3: Wetland Map of Fremont, New Hampshire

The National Wetlands Inventory identifies approximately 11,142 acres of wetland in Fremont. The Town has worked with wetlands scientists to identify several prime wetland complexes, as designated under NH RSA 482-A:15. Fremont is home to Spruce Swamp, the largest wetland complex in Rockingham County, encompassing 827 acres. Spruce Swamp is drained by four streams, two flowing north towards the Piscassic River and one flowing east and one flowing north, both towards the Exeter River.

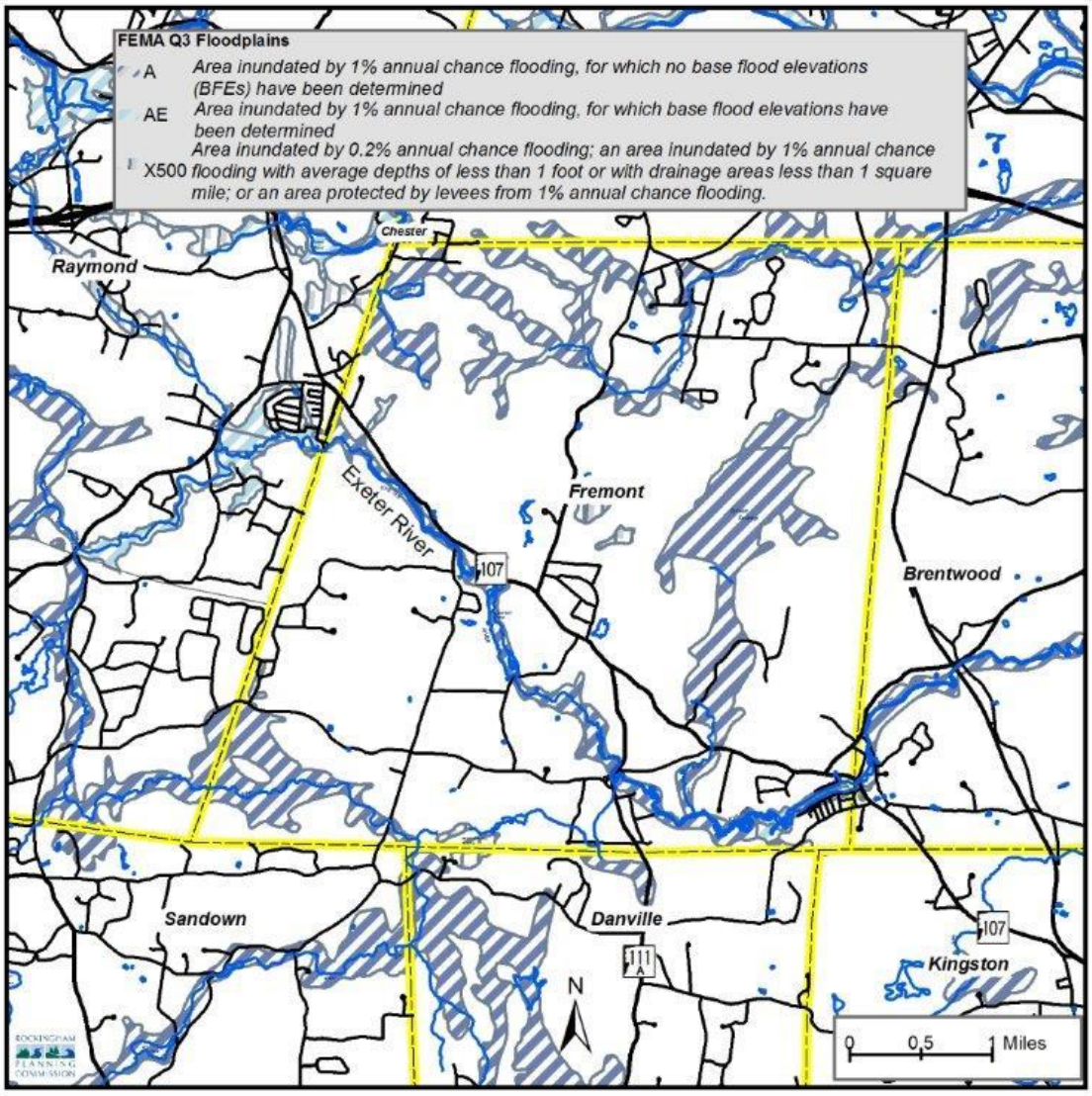

Figure 4: Floodplain Map of Fremont, New Hampshire

Approximately 2,176 acres in Fremont lie with the floodplain, 19.5% of the town's total land area of 11,142 acres.

LAND USE AND DEVELOPMENT

A land use map was prepared for this *Plan* using data from GRANIT (The New Hampshire Geographically Referenced Analysis and Information Transfer System). The land use data was created for Rockingham County in 1998 and was amended in 2010 using 2010 aerial imagery. The data was developed through interpretation of 1:12,000 scale black and white digital orthophoto quadrangles from the United States Geologic Survey. For more information on this data layer please visit http://www.granit.unh.edu/ . This data is presented in Map 1: Fremont Land Use.

Future development in Fremont will continue to be primarily residential developments scattered throughout town, and limited commercial and industrial development in areas zoned for such use, primarily along Route 107. A commercial park has been established along Main Street at Spaulding Road on the site of the former Spaulding and Frost cooperage.

Fremont has experienced rapid growth in population in the past decade. The 2000 US Census population was 3,510 and the 2010 Census population was 4,283, a 22% increase. According to town assessor records over the past five years, the town has granted 53 residential building permits for new residential dwellings and 3 commercial building permits. This increase in population and corresponding rural residential development throughout town requires additional emergency response and the need for mitigation to protect residents, homes, and infrastructure. The Town has adopted land use regulations restricting development and construction in and immediately adjacent to wetlands and floodplains. In addition, the Town has worked with landowners and land conservation organizations to permanently conserve hundreds of acres of riparian land, farmland and forestland from development, enabling this land to provide flood storage during extreme weather events.

MAP 1: LAND USE MAP

CHAPTER III – NATURAL HAZARDS IN THE TOWN OF FREMONT

WHAT ARE THE HAZARDS?

The first step in planning for natural hazard mitigation is to identify hazards that may affect the Town. Some communities are more susceptible to certain hazards (i.e., flooding near rivers, hurricanes on the seacoast, etc.). The Town of Fremont is prone to several types of natural hazards. These hazards include: **flooding, hurricanes, tornadoes, severe winter weather, wildfires, earthquakes, and extreme temperatures**. Other natural hazards can and do affect the Town of Fremont, but these were the hazards prioritized by the Committee for mitigation planning. These were the hazards that were considered to occur with regularity and/or were considered to have high damage potential, and are discussed below.

Natural hazards that are included in the State's Hazard Mitigation Plan that are not included in the *Plan* include: drought, landslide, subsidence, radon and avalanche. Subsidence and avalanche are rated by the State as having Low and No risk in Rockingham County, respectively; due to this they were left out of the *Plan*. Fremont has no record of landslides and little chance of one occurring that could possibly damage property of cause injury; so landslides were not included in this *Plan*. The State's Plan indicates that Rockingham County is at Moderate risk to drought, and radon; these hazards were not included in the *Plan*. When compared to natural hazards that could be potentially devastating to the Town (earthquakes or hurricanes) or natural hazards that occur with regularity (flooding or severe winter weather) it was not considered an effective use of the Committee time to include drought and radon in the *Plan* at this time. Other potential natural Hazards that were considered highly unlikely or only minimally dangerous, and therefore not included in the plan are: tsunami, thunder storms, lightning, or hail. When the *Plan* is revised and updated in the future, possible inclusion of these hazards will be reevaluated.

HAZARD DEFINITIONS

Flooding

Floods are defined as a temporary overflow of water onto lands that are not normally covered by water. Flooding results from the overflow of major rivers and tributaries, storm surges, and/ or inadequate local drainage. Floods can cause loss of life, property damage, crop/livestock damage, and water supply contamination. Floods can also disrupt travel routes on roads and bridges.

Inland floods are most likely to occur in the spring due to the increase in rainfall and melting of snow; however, floods can occur at any time of the year. A sudden thaw in the winter or a major downpour in the summer can cause flooding because there is suddenly a lot of water in one place with nowhere to go. Coastal flooding can be caused by storm surge associated with high wind events hurricanes or from tsunami.

100-year Floodplain Events

Floodplains are usually located in lowlands near rivers, and flood on a regular basis. The term 100 year flood does not mean that flood will occur once every 100 years. It is a statement of probability that scientists and engineers use to describe how one flood compares to others that are likely to occur. It is more accurate to use the phrase "1% annual chance flood". What this means is that there is a 1% chance of a flood of that size happening in any year.

Rapid Snow Pack Melt

Warm temperatures and heavy rains cause rapid snowmelt. Quickly melting snow coupled with moderate to heavy rains are prime conditions for flooding.

River Ice Jams

Rising waters in early spring often breaks ice into chunks, which float downstream and often pile up, causing flooding. Small rivers and streams pose special flooding risks because they are easily blocked by jams. Ice collecting in river bends and against structures presents significant flooding threats to bridges, roads, and the surrounding lands.

Hurricane

A hurricane is a tropical cyclone in which winds reach speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center (see Appendix C). The eye of the storm is usually 20-30 miles wide and may extend over 400 miles. High winds are a primary cause of hurricane-inflicted loss of life and property damage. Hurricanes can also include coastal storm surge. The Saffir–Simpson hurricane wind scale (SSHWS), or the Saffir–Simpson hurricane scale (SSHS) for short, classifies hurricanes (western hemisphere tropical cyclones that exceed the intensities of tropical depressions and tropical storms) into five categories distinguished by the intensities of their sustained winds. To be classified as a hurricane, a tropical cyclone must have maximum sustained winds of at least 74 mph. (Category 1). The highest classification in the scale, Category 5, is reserved for storms with winds exceeding 156 mph. The Saffir/Simpson Hurricane Scale is included in Appendix C.

Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel shaped cloud. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity and the convergence of warm, moist air at low levels with cooler, drier air aloft. Most tornadoes remain suspended in the atmosphere, but if they touch down they become a force of destruction.

Tornadoes produce the most violent winds on earth, at speeds of 280 mph or more. In addition, tornadoes can travel at a forward speed of up to 70 mph. Damage paths can be

in excess of one mile wide and 50 miles long. Violent winds and debris slamming into buildings cause the most structural damage.

The Fujita Scale is the standard scale for rating the severity of a tornado as measured by the damage it causes (see Appendix D). A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison with a hurricane, a tornado covers a much smaller area but can be more violent and destructive.

Severe Winter Weather

Ice and snow events typically occur during the winter months and can cause loss of life, property damage and tree damage.

Heavy Snow Storms

A winter storm can range from moderate snow to blizzard conditions. Blizzard conditions are considered blinding, wind-driven snow over 35 mph that lasts several days. A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period.

Ice Storms

An ice storm involves rain, which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires and similar objects. Ice storms often produce widespread power outages.

Nor'easter

A Nor'easter is a large weather system traveling from South to North passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas form a Northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours (or days) in terms of duration[1].

Wildfire

Wildfire is defined as an uncontrolled and rapidly spreading fire. A forest fire is an uncontrolled fire in a woody area. They often occur during drought and when woody debris on the forest floor is readily available to fuel the fire. Grass fires are uncontrolled fires in grassy areas.

[1] Definition of Nor'easter taken from the State of New Hampshire Multi-Hazard Mitigation Plan Update 2013.

Earthquakes

Geologic events are often associated with California, but New England is considered a moderate risk earthquake zone. An earthquake is a rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines, and often cause landslides, flash floods, fires, and avalanches. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The underground point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the epicenter. The magnitude and intensity of an earthquake is determined by the use of scales such as the Richter scale and Mercalli scale. The Richter scale is included in Appendix E.

Extreme Heat

Fatalities can result from extreme heat as temperatures push the human body beyond its limits, resulting in hypothermia. Extreme heat may require the town to offer cooling stations to protect residents.

PROFILE OF PAST AND POTENTIAL HAZARDS

As discussed above the natural hazards that were identified for mitigation in this Plan include: flooding, hurricanes/tornadoes/high wind events, severe winter weather, wildfire earthquakes, and extreme temperatures. Some of the natural hazards could be included under more than one type of hazard. For example a hurricane could be considered a high wind event or a flooding event depending on the storm's consequences.

The hazard profiles below include: a description of the events included as part of the natural hazard, the geographic location of each natural hazard (if applicable), the extent of the natural hazard (e.g. magnitude or severity), probability, past occurrences, and community vulnerability. Past occurrences of natural hazards were mapped if possible (Map 2: Past and Future Hazards). Some of the natural hazards have not occurred within the Town of Fremont (within written memory), for these hazards the plan refers to a table of hazards that have occurred regionally and statewide (Table 3). Community vulnerability identifies the specific areas, general type of structures, specific structures, or general vulnerability of the Town of Fremont to each natural hazard.

The **extent** of a hazard is the strength or magnitude of a hazard. For this plan extent will be described as Minimal, Moderate or Severe if there is no other appropriate scale to use or data on the extent is limited. These terms are defined as follows: Minimal – local residents can handle the hazard event without help from outside sources. Moderate - county or regional assistance is needed to survive and/or recover. Severe – state or federal assistance is necessary to survive and/or recover.

Probability was defined as high, a roughly 66-100% chance of reoccurrence; moderate, roughly a 33-66% chance of reoccurrence; and low, roughly a 0-33% of reoccurrence.

FLOODING

Description: Flooding events can include hurricanes, 100-year floods, debris-impacted infrastructure, erosion, mudslides, rapid snow pack melt, river ice jams and dam breach and/or failure.

Location: Fremont is vulnerable to flooding in several locations. Generally, the Town is at risk within the Flood Zones identified by FEMA on Flood Insurance Rate Maps (FIRM). Fremont has two major flood zones: A and AE. The AE flood zones are areas that have a 1% annual chance of flooding and have a base flood height determined. A zones also have a 1% annual chance of flooding but have no base flood height determined. There are also several locally-identified areas susceptible to flooding that are not within these flood zones, these areas are described below and displayed on Map 2: Past and Future Hazards.

Extent: The extent of flooding in Fremont can range from minimal to severe. Minimal flooding can result in high water alongside roads and in yards and fields; severe flooding can, and has in Fremont's case, resulted in washed out roads and bridges, stranded motorists, and homes isolated by high and fast moving water.

Probability: **HIGH**

Table 1: Probability of Flooding based on return interval

Flood Return Interval	Chance of Occurrence in Any Given Year
10-year	10%
50-year	2%
100-year	1%
500-year	0.2%

Past Occurrence: Flooding is a common hazard for the Town of Fremont. Several locations were identified as areas of chronic reoccurring flooding or high potential for future flooding. These areas are listed below and depicted on Map 2, Past and Future Hazards. Larger flood events are listed in Table3.

Community Vulnerability: The committee identified over one dozen locations in town prone to flooding of the Exeter River and Piscassic River: Rt. 107 near Sandown Road, Sandown Road, Tibbets Road, Riverside Drive, NH Rt. 111A at Red Brook Drive, Shirking Road, Squire Road, Beede Hill Road, Martin Road, and North Road as being vulnerable to flooding caused by heavy rains, snow

melt, and ice jams. The residential neighborhood along Tibbets Road is especially vulnerable due to its very close proximity to the Exeter River.

Closure of all these roads due to high water and/or unsafe driving conditions can prevent residents from reaching homes and businesses, restrict emergency response vehicles and school bus routes. High water levels and swiftly moving water can cause culvert failure and erosion, undermining road safety.

A summary of Fremont's greatest vulnerabilities to flooding is as follows:

- Structures, primarily residential homes, roads, and land in the flood zone and along Rt. 107 near Sandown Road, Sandown Road, Tibbets Road, Riverside Drive, NH Rt. 111A at Red Brook Drive, Shirking Road, Squire Road, Beede Hill Road, Cavil Mill Road, Clough Crossing, Martin Road, and North Road.
- Dams located on the Exeter River adjacent to Scribner Road in Fremont and River Road on the Fremont/Brentwood town line (see Map 3, Critical Facilities). Beavers also play a role in impounding water ways in town.

National Flood Insurance Program (NFIP)

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victim and the increasing amount of damage caused by floods. The Federal Insurance and Mitigation Administration (FIMA) a component of the Federal Emergency Management Agency (FEMA) manages the NFIP, and oversees the floodplain management and mapping components of the program.

Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce flood damage. In exchange, the NFIP makes federally subsidized flood insurance available to homeowners, renters, and business owners in these communities. Flood insurance, Federal Grants and loans, Federal disaster assistance and federal mortgage insurance is unavailable for the acquisition or construction of structures located in the floodplain shown on the NFIP maps for those communities that do not participate in the program.

To get secure financing to buy, build or improve structures in the Special Flood Hazard areas, it is legally required by federal law to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is located in the SFHA and must provide written notice requiring flood insurance. Flood insurance is available to any property owner located in a community participating in NFIP. Flood damage is reduced by nearly $1 billion a year through partnerships with communities, the insurance industry, and the lending industry. Further, buildings constructed in compliance with NFIP building standards suffer approximately

80 percent less damage annually than those not built in compliance. Additionally, every $3 paid in flood insurance claims saves $1 in disaster assistance payments.

The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid for by the taxpayer, but through premiums collected for flood insurance policies. The program has borrowing authority from the U.S. Treasury for times when losses are heavy; however, these loans are paid back with interest.

Repetitive Loss Properties

A specific target group of repetitive loss properties is identified and serviced separately from other NFIP policies by the Special Direct Facility (SDF). The target group includes every NFIP insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced four or more paid losses, two paid flood losses within a 10-year period that equal or exceed the current value of the insured property, or three or more paid losses that equal or exceed the current value of the insured property, regardless of any changes of ownership, since the buildings construction or back to 1978. Target group policies are afforded coverage, whether new or renewal, only through the SDF.

The FEMA Regional Office provides information about repetitive loss properties to State and local floodplain management officials. The FEMA Regional Office may also offer property owners building inspection and financial incentives for undertaking measures to mitigate future flood losses. These measures include elevating buildings from the flood area, and in some cases drainage improvement projects. If the property owners agree to mitigation measures, their property may be removed from the target list and would no longer be serviced by the SDF.

Table 2: Fremont NFIP Policy and Loss Statistics

Policies in force	Insurance in Force	Number of Paid Losses (since 1978)	Total Losses Paid (Since 1978)
35 residential	$7,165,000.00	38	$851,401.85
Source: FEMA Policy and claims database, as of 2/28/15			

Fremont NFIP Repetitive Flooding Losses

Fremont joined the Regular Program of the NFIP on April 21, 1988. Fremont is part of the Rockingham County DFIRMs and FIS, which are both dated May 17, 2005. As of February 2015, Fremont has had 9 repetitive loss residential properties according to New Hampshire Office of Energy and Planning (NHOEP) records. This is determined by any repetitive damage claims on those properties that hold flood insurance through the NFIP.

Floodplain Management Goals/Reducing Flood Risks

A major objective to floodplain management is to continue participation in the NFIP and evaluate continued required compliance criteria within the program. Communities that agree to manage Special Flood hazard Areas shown on NFIP maps participate in the NFIP by adopting minimum standards. The minimum requirements are the adoption of the Floodplain Ordinances and Subdivision/Site Plan Review requirements for land designated as Special Flood hazard Areas. Under Federal Law, any structure located in the floodplain is required to have flood insurance. Federally subsidized flood insurance is available to any property owner located in a community participating in the NFIP. Communities that fail to comply with the NFIP will be put on probation and/or suspended. Probation is a first warning where all policy holders receive a letter notifying them of a $50 increase in their insurance. In the event of suspension, the policyholders lose their NFIP insurance and are left to purchase insurance in the private sector, which is of significantly higher cost. If a community is having difficulty complying with NFIP policies, FEMA is available to meet with staff and volunteers to work through the difficulties and clear up any confusion before placing the community on probation or suspension.

Potential Administrative Techniques to Minimize Flood Losses in Fremont

A potential step in mitigating flood damage is participating in NFIP. Fremont continues to consistently enforce NFIP compliant policies in order to continue its participation in this program and has effectively worked within the provisions of NFIP by ensuring buildings, if built in the floodplain, comply with NFIP building standards and practices.

Since joining the NFIP in 1988 the Town has amended its zoning ordinance and regulations to better comply with NFIP standards as well as review the potential for joining the Community Rating System. In addition, the Town actively participated in a Fluvial Geomorphic Assessment of the Exeter River in 2008 and 2009, led by the NH Department of Environmental Services and the Exeter River Local Advisory Committee. The Assessment identified several locations in Fremont along the Exeter River where bank stabilization, upgraded culverts, and land conservation could help to reduce flood damage. The Town continues to work with landowners to permanently conserve land located along the Exeter River from development, and work to replace and upgrade culverts identified in the Geomorphic Assessment has also taken place. Below is a list of actions Fremont will consider, or continue to perform, in order to comply with NFIP:

- Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management;
- Establish Mutual Aid Agreements with neighboring communities to address administering the NFIP following a major storm event;
- Address NFIP monitoring and compliance activities;
- Revise/adopt subdivision regulations, erosion control regulations, board of health regulations to improve floodplain management in the community;

- Prepare, distribute or make available NFIP insurance and building codes explanatory pamphlets or booklets;
- Identify and become knowledgeable of non-compliant structures in the community;
- Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation (BFE), if they are in the floodplain;
- Require the use of elevation certificates;
- Enhance local officials, builders, developers, local citizens and other stakeholders' knowledge of how to read and interpret the FIRM;
- Work with elected officials, the state and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education.

HURRICANE

Description: As described on page 12.

Location: Hurricane events are more potentially damaging with increasing proximity to the coast. For this *Plan*, high-wind events were considered to have an equal chance of affecting any part of the Town of Fremont.

Extent: Hurricane strength is measured using the Saffir-Simpson Scale as located in Appendix C of this plan. Fremont is located within a Zone II hurricane-susceptible region (indicating a design wind speed of 160 mph)[2]. Between 1900 and 2013 2 hurricanes have made landfall in New Hampshire, a category 1 and a category 2. In Maine, 5 hurricanes have made landfall (all category 1). In Massachusetts, 6 hurricanes have made landfall (2 category 1, 2 category 2 and 2 category 3). From this information it can be extrapolated that Fremont is a high risk to a hurricane event, with variable wind speeds between 74 – 130 mph (category 1-3).

Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of hurricane events.

Past Occurrence: Between 1635 and 2013 14 hurricanes have impacted the State of New Hampshire. The worst of these occurred on September 21, 1938, with wind speeds of up to 186 mph in MA and 138mph elsewhere. Thirteen of 494 people killed by this storm were residents of New Hampshire. The Storm caused $12,337,643 in damages (1938 dollars), timber not included. The impact of these hurricanes on the Town of Fremont is unclear. Local knowledge did not indicate that any lives were lost or that property damage was severe.

[2] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA, page 3-22

Community Vulnerability: The high winds and rain associated with hurricanes can impact Fremont before, during and after the storm, resulting in downed trees and power lines, flooding of rivers, streams, roads, and basements, and damage to homes, businesses and community infrastructure. The Committee determined that every neighborhood in Fremont is vulnerable to the impacts from hurricanes, with the following being most at risk:

- Power lines
- Shingled roofs
- Chimneys
- Trees
- Mobile homes

Hurricane Sandy and Irene resulted in widespread power outages in Fremont for a period of five days week, or more for some neighborhoods. Several roads were closed during both hurricanes due to debris and downed trees, limbs, and utility lines. The Town received $14,117.25 in funds from FEMA in 2012 as a result of costs incurred from Hurricane Sandy.

TORNADOES

Description: As described on page 12.

Location: For this *Plan*, Tornado events were considered to have an equal chance of affecting any part of the Town of Fremont.

Extent: Tornadoes are measured utilizing the Fujita damage scale located in Appendix D of this plan. From 1950 to 2013 Rockingham County was subject to 9 recorded tornado events, these included 2 type F0 (Gale Tornado, 40-72 mph), 2 type F1 (Moderate Tornado, 73-112 mph), 4 type F2 (Significant Tornado, 113-157 mph) and 1 type F3 (Severe Tornado, 158-206 mph)[3]. Type 3 tornados can cause severe damage including tearing the roofs and walls from well-constructed homes, trees can be uprooted, trains over-turned, and cars lifted off the ground and thrown[4].

Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of tornado events.

Past Occurrence: Rockingham County tornado history is listed in Table 4, Past Hazard Events in Fremont, NH and Rockingham County.

[3] The tornado project .com

[4] "Understanding Your Risks, Identifying Hazards and Estimating Losses", FEMA, page

Community Vulnerability: The Committee determined that all neighborhoods in Fremont are vulnerable to the impacts associated with the high winds and flying debris caused by tornadoes. Population density is distributed relatively equally across town, causing the need for shelter in place to be equal across town. Mobile homes are more vulnerable to tornadoes than conventionally built residences. Other infrastructure at risk include:

- Power lines
- Shingled roofs
- Chimneys
- Trees

SEVERE WINTER WEATHER

Description: There are three types of winter events**:** blizzards, ice storms and extreme cold. All of these events are a threat to the community with subzero temperatures from extreme wind chill and storms causing low visibility for commuters. Snow storms have been known to collapse buildings. Ice storms disrupt power and communication services. Extreme cold affects the elderly.

Location: Severe winter weather events have an equal chance of affecting any part of the Town of Fremont.

Extent: Large snow events in Southeastern New Hampshire can produce 30 inches of snow, or more. Portions of central New Hampshire recorded snowfalls of 98" during one slow moving storm in February of 1969. Ice storms, which can be measured utilizing the Sperry-Piltz (Appendix J) ice accumulation scale as found in appendix F of this plan, occur with regularity in New England. Seven severe ice storms have been recorded that affected New Hampshire since 1929. These events caused disruption of transportation, loss of power and millions of dollars in damage.

Probability: **HIGH**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 rates Rockingham County with high likelihood of heavy snows and ice storms.

Past Occurrence: A list of past winter storm events is displayed below, in Table 4.

Fremont has been impacted by several severe winter storms in the past five years. A storm on January 2, 2009 resulted in the removal of heavy tree debris from roadways, with over 75% of town roads impacted. The Town received $25,947.59 in FEMA funds in 2009. A storm on January 12-14, 2010 resulted in snowfalls over 15 inches, requiring constant snow removal to keep roadways safe. A nor'easter on February 15, 2010 caused flooding on Red Brook, Main Street, Clough Crossing, Bogs Bridge, Cavil Mill Road, Sribner Road and Tibbs Grove.

The Town received $22,567.83 in FEMA funds in 2010. Storms on March 11 and March 29, 2010 caused extensive flooding that damaged roads and culverts, causing temporary road closures. Heavy, wet snowfall was recorded in town on October 29, 2011, resulting in downed power lines. A blizzard struck town on February 8 and 9th, 2013, requiring 48 continuous hors of snow removal and sanding to keep roads safe. The Town was reimbursed $18,103.83 from FEMA in 2013. Snowfall in January and February 2015 damaged the roof of the library due to heavy snowload.

Community Vulnerability: Severe winter weather has struck Fremont and every other town in the region on an annual basis in recent memory. The Committee determined that heavy snow, strong and gusty winds, and frigid temperature can impact all parts of town equally, resulting downed trees and power lines, extended power outages, and unsafe driving conditions. Extended power outages and the resulting loss of heat in homes of elderly residents is of concern. Rapid snow melt and severe winter weather can result in flooding of rivers and streams, posing risks to roads and structures. The Committee identified the following at greatest risk from severe winter weather:

- Power lines
- Trees, including impacts roads on utility rights of way
- Elderly Populations

WILDFIRE

Description: Wildfires include grass fires and forest fires.

Location: The Committee identified areas of Town as at-risk to wildfires (see Map 2: Past and Future Hazards).

Extent: A wildfire is defined as a fire in wooded, potentially remote areas that may endanger lives. Wildfire can be measured utilizing the NWCG Classification of fire size[5]. New Hampshire has about 500 wildfires each year; most of these burn less than half an acre. A wildfire in the Town of Fremont is unlikely, but if a crown fire were to occur it could be very damaging to structures abutting large wooded areas of Town. The Wildland-Urban Interface Scale, a tool to quantify the expected severity of wildfire events in developed areas, is included in Appendix J.

Probability: **MODERATE**. The State of New Hampshire's Multi-Hazards Mitigation Plan Update 2013 rates Rockingham County with moderate risk to wildfires.

[5] http://www.nwcg.gov/pms/stds/standards/fire-size-class_v1-0.htm#definition

Past Occurrence: No major wildfires have occurred in Fremont.

Community Vulnerability: The Committee identified three areas in town prone to wildfires, as depicted on Map 2, Past and Future Hazards. These areas are located along the power lines in the southeast corner of town, along the Class VI road that connects Meeting House Road and Tavern Road in the center of town, and along Shirking Road and Squire Road in the northwest corner of town. The Committee summarized the threats as follows:

- Structures located near large open vegetated areas prone to lightning strike
- Vulnerability increases during drought events
- Tree debris

EARTHQUAKE

Description: Seismic activity including landslides and other geologic hazards.

Location: An earthquake has an equal chance of affecting all areas in the Town of Fremont.

Extent: Earthquakes are measured utilizing the Richter Magnitude Scale as detailed in Appendix E of this plan. New England is particularly vulnerable to the injury of its inhabitants and structural damage because of our built environment. Few New England States currently include seismic design in their building codes. Massachusetts introduced earthquake design requirements into their building code in 1975 and Connecticut very recently did so. However, these specifications are for new buildings, or very significantly modified existing buildings only. Existing buildings, bridges, water supply lines, electrical power lines and facilities, etc. have rarely been designed for earthquake forces (New Hampshire has no such code specifications).

Probability: **MODERATE**. The State of New Hampshire's Multi-Hazard Mitigation Plan Update 2013 ranks all of the Counties in the State with at moderate risk to earthquakes. The Town of Fremont's Peak Ground Acceleration (PGA) values range between 6.1 and 21.0[6]. These numbers are associated with how much an earthquake is felt and how much damage it may cause (Table 3).

Table 3: Peak Ground acceleration (PGA) values for Fremont (information from State and Local Mitigation Planning, FEMA).

PGA	Chance of being	Perceived Shaking	Potential Damage

[6] http://geohazards.cr.usgs.gov/eq/pubmaps/us.pga.050.map.gif

	exceeded in the next 50 years		
6.1	10%	Moderate	Very Light
10.6	5%	Strong	Light
21.0	2%	Very Strong	Moderate

Past Occurrence: Large earthquakes have not affected the Town of Fremont within recent memory. A list of earthquakes that have affected the region is displayed in Table 4.

Community Vulnerability: The Committee determined that earthquakes do not pose a frequent threat to Fremont, but if one were to occur that the most vulnerable structures include the two dams on the Exeter River, at Scribner Road and Mill Road (in Brentwood), the five bridge crossings over the Exeter and Piscassic Rivers, the old water tower at the former Spaulding and Frost Cooperage on Rt. 107, and older structures and historic residences of which there are many in town. To summarize, the following are at risk of damage due to earthquakes:

- Dams over the Exeter River at Scribner Road and Mill Road
- Bridge crossings over the Exeter River and Piscassic River
- Older historic structures and residences
- Infrastructure, such as power lines
- Secondary hazards such as fire, power outages, or hazardous material leaks or spills

EXTREME HEAT

Description: Extreme heat is typically recognized as the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for a 24-72 hours. Fatalities can result from extreme temperatures, as they can push the human body beyond its limits.

Location: Extreme heat can affect all areas of Fremont.

Extent: Extreme heat events impact Fremont for 2-3 days each summer. FEMA's Heat Index measures a number in degrees Farenheit that tells how hot it feels when relative humidity is added to the air temperature.

Probablility: **HIGH**

Past Occurrence: Annually

Community Vulnerability: The Committee determined that all parts of town are at risk to the impacts associated with high heat.

Table 4: State of New Hampshire
Presidentially Declared Disasters (DR) and Emergency Declarations (EM) 1982-2013
Source*: State of NH Multi-Hazard Mitigation Plan 2013 Update*

Date Declared	Event	FEMA DR	Program	Amount	Counties Declared
August 27, 1986	Severe storms/flooding	FEMA-771-DR	PA	$1,005,000	Cheshire & Hillsborough
April 16, 1987	Severe storms/flooding	FEMA-789-DR	PA/IA	$4,888,889	Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, and Sullivan
August 29, 1990	Severe Storms/Winds	FEMA-876-DR	PA	$2,297,777	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, and Sullivan
September 9, 1991	Hurricane	FEMA-917-DR	PA	$2,293,449	Statewide
November 13, 1991	Coastal Storm/Flooding	FEMA-923-DR	PA/IA	$1,500,000	Rockingham
March 16, 1993	Heavy Snow	FEMA-3101-EM	PA	$832,396	Statewide
January 3, 1996	Storms/Floods	FEMA-1077-DR	PA	$2,220,384	Carroll, Cheshire, Coos, Grafton, Merrimack, and Sullivan
October 29, 1996	Severe Storms/Flooding	FEMA-1144-DR	PA	$2,341,273	Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
January 15, 1998	Ice Storm	FEMA-1199-DR	PA/IA	$12,446,202	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Strafford, and Sullivan
July 2, 1998	Severe Storms	FEMA-1231-DR	PA/IA	$3,420,120	Belknap, Carroll, Grafton, Merrimack, Rockingham, and Sullivan
October 18, 1999	Hurricane/Tropical Storm Floyd	FEMA-1305-DR	PA	$750,133	Belknap, Cheshire, and Grafton
March 2001	Snow Emergency	FEMA-3166-EM	PA	$4,500,000	Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, and Strafford
February 17-		FEMA-			Cheshire, Hillsborough,

18, 2003	Snow Emergency	3177-EM	PA	$3,000,000	Merrimack, Rockingham, and Strafford
September 12, 2003	Severe storms and flooding	FEMA-1489-DR	PA	$1,300,000	Cheshire and Sullivan
March 11, 2003	Snow Emergency	FEMA-3177-EM	PA	$3,000,000	Cheshire, Hillsborough, Merrimack, Rockingham, and Strafford
January 15, 2004	Snow Emergency	FEMA-3193-EM	PA	$3,200,000	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, and Sullivan

Date Declared	Event	FEMA DR	Program	Amount	Counties Declared
March 30, 2005	Snow Emergency	FEMA-3207-EM	PA	$4,654,738	Belknap, Carroll, Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford and Sullivan
March 30, 2005	Snow Emergency	FEMA-3208-EM	PA	$1,417,129	Carroll, Cheshire, Coos, Grafton and Sullivan
April 28, 2005	Snow Emergency	FEMA-3211-EM	PA	$2,677,536	Carroll, Cheshire, Hillsborough, Rockingham and Sullivan
October, 26, 2005	Severe Storm and Flooding	FEMA-1610-DR	PA/IA	$14,996,626 +	Belknap, Cheshire, Hillsborough, Merrimack and Sullivan. Grafton
May 31, 2006	Severe Storm and Flooding	FEMA-1643-DR	PA/IA	$17,691,586 +	Belknap, Carroll, Hillsborough, Merrimack, Rockingham, Strafford and Grafton
April 15 - 23, 2007	Severe Storm and Flooding	FEMA-1695-DR	PA/IA	$27,000,000 +	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan.
August 11, 2008	Severe Storms, Tornado, and Flooding	FEMA-1782-DR	PA	$1,691,240	Belknap, Carroll, Merrimack, Rockingham, and Strafford
September 5, 2008	Severe Storms and Flooding	FEMA-1787-DR	PA	$4,967,595	Belknap, Coos, and Grafton
October 3, 2008	Severe Storms and Flooding	FEMA-1799-DR	PA	$1,050,147	Hillsborough and Merrimack
December 11, 2008	Severe Winter Storm	FEMA-3297-EM	DFA/PA	$900,000	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
					Belknap, Carroll, Cheshire, Coos,

January 2, 2009	Severe Winter Storm	FEMA-1812-DR	DFA/PA	$19,789,657	Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan
March 29, 2010	Severe Winter Storm	FEMA-1892-DR	PA	$9,103,138	Merrimack, Rockingham, Strafford, and Sullivan
May 12, 2010	Severe Winter Storm	FEMA-1913-DR	PA	$3,057,473	Hillsborough and Rockingham
July 22, 2011	Severe Storms and Flooding	FEMA-4006-DR	PA	$1,664,140	Coos and Grafton
Date Declared	**Event**	**FEMA DR**	**Program**	**Amount**	**Counties Declared**
September 3, 2011	Tropical Storm Irene	FEMA-4026-DR	PA/IA	$11,101,752	Belknap, Carroll, Coos, Grafton, Merrimack, Stratford, and Sullivan
December 7, 2011	October Nor'Easter	FEMA-4049-DR	PA	$4,411,457	Hillsborough and Rockingham
June 18, 2012	Severe Storms and Flooding	FEMA-4065-DR	PA	$unknown	Cheshire
October 30, 2012	Hurricane Sandy	DR-4095 EM-3360	PA DFA	$unknown	Belknap, Carroll, Cheshire, Coos, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan.
February 08-10-2013	Severe Snow and Blizzard	DR-4105	PA	$Unknown	Belknap, Carroll, Cheshire, Hillsborough, Merrimack, Strafford, Rockingham

35 Declarations Totaling $ 175,166,810.00

Program Key: PA: Public Assistance **IA**: Individual Assistance **DFA**: Direct Federal Assistance

MAP 2: PAST AND FUTURE HAZARDS

CHAPTER IV – CRITICAL FACILITIES

The Critical Facilities List for the Town of Fremont has been identified by Fremont's Hazard Mitigation Committee. The Critical Facilities List has been broken up into four categories. The *first category* contains facilities needed for Emergency Response in the event of a disaster. The *second category* contains Non-Emergency Response Facilities that have been identified by the committee as non-essential. These are not required in an emergency response event, but are considered essential for the everyday operation of Fremont. The *third category* contains Facilities/Populations that the committee wishes to protect in the event of a disaster. The *fourth category* contains Potential Resources, which can provide services or supplies in the event of a disaster. Map 3: Critical Facilities at the end of this Chapter identifies the location of the facilities and the evacuation routes. A list of the critical facilities can be found in Table 5.

Table 5: Category 1 - Emergency Response Services and Facilities:

The first category contains facilities needed for Emergency Response in the event of a disaster.

Critical Facility	Facility Type
Fremont Public Safety Complex (EOC, Police Dept., Fire Dept.)	Public building
Fremont Town Hall	Public building
Fremont Highway Shed	Public building

Table 5: Category 2 - Non Emergency Response Facilities:

The Town has identified these facilities as non-emergency facilities; however, they are considered essential for the everyday operation of Fremont.

Critical Facility	Facility Type
Ellis Elementary School	Public Building
Fremont Public Library	Public Building
Liberty Square Market	Retail Market
Village Market	Retail Market
AT&T cell towers (2)	Cell Tower
Verizon cell tower	Cell Tower
NH Routes 107 & 111A	Evacuation Routes
Phillips Dam in Brentwood	Dam
Scribner Dam	Dam
Martin Road Bridge	Bridge
Scribner Road Bridge	Bridge
Sandown Road Bridge	Bridge

Table 5: Category 3 - Facilities/Populations to Protect:

The third category contains people and facilities that need to be protected in event of a disaster.

Critical Facility	Facility Type
Ellis Elementary School	Public Education
Historic Museum	Public Building
Colonial Poplin and Poplin Way	Senior Citizen Residential & Nursing
Country Side Estates	Senior Citizen Residential
Governor's Forest	Senior Citizen Residential
Black Rocks Village	Senior Citizen Residential
Barnyard Buddies	Child Day Care
Country Club for Kids	Child Day Care
Fremont Early Learning	Child Day Care

Table 5: Category 4 - Potential Resources:

This category contains facilities that provide potential resources for services or supplies in the event of a natural disaster.

Critical Facility	Facility Type
Hannaford's - Raymond	Grocery Store
Market Basket - Epping	Grocery Store
Lowe's - Epping	Retail Hardware
Fremont Machine and Tool	Equipment and Supplies
Brookvale Pines Farm	Equipment and Supplies
LCB Transport	Equipment and Supplies
LeClair Logging	Equipment and Supplies
Best Machine	Equipment and Supplies
American Steel and Aluminum	Equipment and Supplies
Danley Demolition	Equipment and Supplies
Fremont Animal Hospital	Veterinary
NH DOT Shed - Kingston	Equipment and Supplies

MAP 3: CRITICAL FACILITIES MAP

CHAPTER V – POTENTIAL HAZARD AFFECTS

IDENTIFYING VULNERABLE FACILITIES

It is important to determine what the most vulnerable areas of the Town of Fremont are and to estimate their potential loss. The first step is to identify the areas most likely to be damaged in a hazard event. To do this, the locations of buildings and other structures were compared to the location of potential hazard areas identified by the Hazard Mitigation Committee using GIS (Geographic Information Systems). Vulnerable buildings were identified by comparing their location to possible hazard events. For example, all of the structures within the 100-year floodplain were identified and used in conducting the potential loss analysis for flooding.

CALCULATING THE POTENTIAL LOSS

The next step in completing the loss estimation involved assessing the level of damage from a hazard event as a percentage of the buildings' assessed value. For the purposes of estimating losses and average values per residential structure was determined. The total value for all structures in Fremont in 2014, residential and commercial was provided by the Town: $264,971,000. The average value of a structure in 2014 was estimated to be $175,000.

The damage estimates are divided into two categories based on hazard types: hazards that are location specific, such as flooding, and hazards that could affect all areas of Fremont equally, such as extreme heat. Damage estimates from hazards with a specific location were calculated by determining how many structures were in the identified hazard area using 2005 digital aerial images of Fremont, and then making the damage estimates based on the average value of residential structures determined above. This method makes the assumption that all of the affected structures are residential. Damage estimates from hazards that could affect all of Fremont equally are much rougher estimates, based on percentages of the total assessed value of the structures and utilities in Fremont.

After identifying the parcels and buildings that are at risk, the next step was to calculate a damage estimate for each potential hazard area. FEMA provides a model for estimating damage for various flooding events, so the flood damage estimates provide information including: damage estimates for structures, contents of buildings, functional downtime and replacement time. For wildfire and urban conflagration, damage estimates were determined for the buildings in the potential hazard areas as well as estimates of the building content value, based on the same estimates from the flood model. The following discussion summarizes the potential loss estimates due to natural hazard events.

FLOODING

These structures were identified by overlaying digital versions of FEMA's FIRM maps on 2005 digital aerial photography of the town of Fremont. Because of the scale and resolution of the FIRM maps and imagery this is only an approximation of the total structures located within the 100-year floodplain (A-zone and AE-zone). The Federal

Emergency Management Agency (FEMA) has developed a process to calculate potential loss for structures during flood. The potential loss for residential and non-residential structures was calculated separately. All structures were assumed to be single family residential units. The average assessed value of a structure was $175,000.

The costs for repairing or replacing bridges, railroads, power lines, telephone lines, and contents of structures are not included in this estimate. In addition, the figures used were based on buildings which are one or two stories high with basements. The percentage of structural damage and contents damage that could be expected for each flood depth is shown in Table 6, along with estimates of functional downtime (how long a business/residence would be down before relocating) and displacement time (how long a business/residence would be displaced from its flooded location).

The following calculation is based on **one-foot flooding** and assumes that, on average, one or two story buildings with basements receive 15% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 15%

Approximately 85 structures in the AE Zone valued at $14,875,000 = $2,231,250 potential damage.

Approximately 90 structures in the A Zone valued at $15,750,000= $2,362,500 potential damage.

The following calculation is based on **two-foot flooding** and assumes that, on average, one or two story buildings with basements receive 20% damage (Understanding Your Risks, Identifying Hazards and Estimating Losses, FEMA page 4-13):

Potential Structure Damage: 20%

Approximately 85 structures in the AE Zone valued at $14,875,000 = $2,975,000 potential damage.

Approximately 90 structures in the A Zone valued at $15,750,000 = $3,150,000 potential damage.

Table 6: Percentages of structural and content damage, based on the assessed value of a flooded parcel. Also shows the functional downtime and displacement time for each flood event.

Flood Depth	One-foot	Two-foot	Four-foot
% Structural Damage: Buildings	15%	20%	28%
% Structural Damage: Mobile Homes	44%	63%	78%
% Contents Damage:	22.5%	30%	42%

Buildings			
% Contents Damage: Mobile Homes	30%	90%	90%
Flood Functional Downtime: Buildings	15 days	20 days	28 days
Flood Functional Downtime: Mobile Homes	30 days	30 days	30 days
Flood Displacement Time: Buildings	70 days	110 days	174 days
Flood Displacement Time: Mobile Homes	302 days	365 days	365 days

~Dam Breach and Failure

Dam breach and failure could impact Fremont through flooding. Potential losses will depend on the extent of the breach and would mostly affect roadway infrastructure. There are two man-made dams that could cause flooding if breeched, Scribner Road Dam along the Exeter River on Scribner Road and Phillips Dam, also along the Exeter River on Mill Road on the Fremont/Brentwood town line.

In addition, there are several large beaver dams located throughout Fremont on private land that could cause road and field flooding if breeched. The Committee determined that an approximate dollar value of potential damage is not known without conducting a detailed engineering study on the specific dam sites, as well as measuring the potential downstream impacts.

HURRICANE/HIGH WIND EVENTS

~Hurricane

Hurricanes do affect the Northeast coast periodically. Since 1900, 2 hurricanes have made landfall in the State of New Hampshire. Due to the coastal location of the Town of Fremont, hurricanes and storm surges present a real hazard to the community. Even degraded hurricanes or tropical storms could still cause significant damage to the structures and infrastructure of the Town of Fremont. The assessed value of all residential, commercial and industrial structures in the Town of Fremont is $580,307,814. Assuming 1% to 5% damage, a hurricane could result in $5,803,078 to $29,015,390 of structure damage.

~Tornado

Tornadoes are relatively uncommon natural hazards in New Hampshire. On average, about six touch down each year. Damage largely depends on where the tornado strikes. If is strikes an inhabited area, the impact could be severe. The assessed value of all residential, commercial and industrial structures in the Town of Fremont is $580,307,814.

Assuming 1% to 5% damage, a hurricane could result in $5,803,078 to $29,015,390 of structure damage.

~Severe Lightning

The amount of damage caused by lightning will vary according to the type of structure hit and the type of contents inside. There is no record of monetary damages inflicted in the Town of Fremont from lightning strikes.

SEVERE WINTER WEATHER

~Heavy Snowstorms

Heavy snowstorms typically occur during January and February. New England usually experiences at least one or two heavy snow storms with varying degrees of severity each year. Power outages, extreme cold and impacts to infrastructure are all effects of winter storms that have been felt in Fremont in the past. All of these impacts are a risk to the community, including isolation, especially of the elderly, and increased traffic accidents. Damage caused as a result of this type of hazard varies according to wind velocity, snow accumulation and duration. Heavy snowstorms in Fremont could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

~Ice Storms

Ice storms often cause widespread power outages by downing power lines, making power lines at risk in Fremont. They can also cause severe damage to trees. In 1998, an ice storm inflicted $12,466,202 worth of damage across New Hampshire and in 2008 an ice storm, which mostly impacted southern NH communities, experienced over a reported $150 million dollars worth of property damage. Ice storms in Fremont could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

WILDFIRE

The risk of fire is difficult to predict based on location. Forest fires are more likely to occur during years of drought. However, these areas are identified as at risk to wildfire (Map 2: Past and Future Hazards) by the Hazard Mitigation Committee. These areas include large tracts of open vegetation including forests and wetlands. Drought conditions increase the risks of wildfire in these open vegetated areas. The area of Fremont at risk to potential wildfire is predominantly a residential portion of town. The assessed value of all residential, commercial and industrial structures in the Town of Fremont is $264,971,000. Assuming 1% to 5% damage, a hurricane could result in $2,648,710 to $13,248,550 of structure damage.

EARTHQUAKES

Earthquakes can cause buildings and bridges to collapse, disrupt gas, electric and phone lines and are often associated with landslides and flash floods. Four earthquakes in New

Hampshire that occurred between 1924-1989 had a magnitude of 4.2 or more. Two of these occurred in Ossipee, one west of Laconia, and one near the Quebec border. If an earthquake were to impact the Town of Fremont, underground lines would be susceptible. In addition, buildings that are not built to a high seismic design level would be susceptible to structural damage. For example, the assessed value of all structures in the Town of Fremont is $264,971,000. Assuming 1% to 5% damage, an earthquake could result in $2,648,710 to $13,248,550 of structure damage.

CHAPTER VI – EXISTING HAZARD MITIGATION ACTIONS

The next step involves identifying existing mitigation strategies for the hazards likely to affect the town and evaluate their effectiveness. This section outlines those programs and recommends improvements and changes to these programs to ensure the highest quality emergency service possible. Poor is defined as an action in need of improvement; Average is defined as an action that is fair but could use some improvement in order to be effective; and Good is defined as an action that does not need further improvements and is effective.

Table 7: Existing Hazard Mitigation Actions

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Zoning Ordinance	Town-wide	Code Enforcement Officer	Good Most recent update March 2015	Contains shoreland, wetland and floodplain provisions that are effective at mitigating negative impacts from development such as but not limited to stormwater runoff. The zoning ordinance is reviewed annually to ensure consistency with the Master Plan.
Subdivision Regulations	Town-wide	Planning Board	Good	Evaluated annually updated as needed. Regulations are effective at mitigating the stormwwater and fire impacts of subdivision development.
Site Plan Review Regulations	Town-wide	Planning Board	Good	Regulation meets effective targets for mitigating impacts from snow and rain events.

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Road Design Standards	Town-wide	Planning Board/Board of Selectmen	Good	Evaluated annually and updated as needed to ensure an effective strategy for safe road access and design.
Culvert Inspection and Maintenance Program	Town-wide	Road Agent	Good	Culverts are inspected annually and problems are addressed quickly.
Master Plan	Town-wide	Planning Board	Good	Updated on a regular basis. Includes directives for future land use changes in town.
Capital Improvements Plan	Town-wide	Planning Board	Average	Committee formed in March 2015 to update CIP
Building Codes	Town-wide	Building Inspector	Good	The code is in line with the most recent state and federal standards and is effective at ensuring meeting safety standards to hazard events. It will continue to be reviewed annually.
Emergency Operations Plan	Town-wide	EMD	Good	Plan is reviewed annually and updated as needed.
HazMat Training	Town-wide	EMD	Average	Training is done periodically to ensure proper emergency response.
School Emergency Response Plan	Ellis School	SAU Superintendent	Good	Plan is reviewed by SAU annually.

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Emergency Service: Police Department	Town-wide	Police Chief	Good	4 full-time officers and 6 part-time officers that effectively respond to hazard and other emergency events in town. Staff levels are reviewed annually based on town needs.
Emergency Services: Fire Department	Town-wide	Fire Chief	Good	36 on-call firefighters that effectively respond to fire hazards throughout town. Staff levels are reviewed annually based on town needs.
Highway Department	Town-wide	Road Agent	Good	Storm drain, catch basin and culvert maintenance, snow removal, road-side mowing, Tree maintenance within Town Right-of-Way. The highway department is effective at ensuring the above maintenance is done annually to mitigate hazard events in town.
Wetlands and Watershed Protection District Regulations	Wetland setbacks required	Planning Board/ Board of Selectmen/NH DES	Good	The Town has an effective setback and buffer requirement (100') between development and defined wetlands.

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Stormwater Management Regulations	Town-wide	Planning Board	Good	Continue to monitor effectiveness of regulations as climate patterns change
Shoreland Protection Program	River corridors	Code Enforcement Officer/Planning Board/NH DES		
Floodplain Development Ordinance	Town-wide	Code Enforcement Officer/Planning Board	Good	The Town has adopted floodplain development standards
Police and Fire Mutual Agreements Mutual Aid	Town-wide/Region	Police Chief and Fire Chief	Good	The town and regional partners continue to evaluate and uphold effective regional emergency response, including the State Task Force, Regional Tactical Team, Regional Incident Management Team, Seacoast Chiefs, Regional Mobile Command Post. Mutual aid agreements are reviewed annually.
Regional Association of Road Agents	Town-wide/Region	Road Agent	Good	Monthly meeting of Road Agents in region to address issues of common concern.
Regional Association of Health Providers	Town-wide/Region	Board of Selectmen	Good	Town participates in regional group concerned with public health

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Road side tree trimming program	Town-wide	Road Agent	Good	Fremont works with PSNH annually to review and ensure trees are cleared away from power lines on municipal roadways. This program is effective at eliminating damage and power outage from ice storms and severe wind storms.
NFIP	Town-wide	Building Inspector	Good	Fremont maintains status as a participating NFIP community and has an effective history of compliance with FEMA and NFIP building standards. Compliance requirement are reviewed annually by the code enforcement officer to ensure continue compliance with program directives.
Land Conservation Program	Town-wide	Board of Selectmen	Good	The Town works regularly with landowners and land conservation organizations to permanently protect land from development. This has resulted in hundreds of acres of land that can be used for flood storage.

Existing Protection	Area Covered	Responsible Local Agent	Effectiveness (Poor, Average, Good)	Recommended Changes-Actions-Comments
Dam Management	Phillips Dam and Scribner Road Dam	Road Agent	Good	Phillips Dam, and Scribner Road Dam are all privately owned and managed. The Road Agent maintains good communication with all managers.
Participation on Exeter-Squamscott River Local Advisory Committee	Exeter River corridor	Volunteer Committee	Good	Town residents participate on this watershed committee to advocate for land conservation and planning in the river corridor
Reverse 911	Town-wide	NH system	Good	The Reverse 911 system is operated by SAU 16. The Town uses the system on an as-needed basis.
Public Safety Education	Town-wide	Board of Selectmen	Good	Town cable access channel, website and monthly Town newsletter are used to educate residents about hazard mitigation

CHAPTER VII – POTENTIAL MITIGATION ACTIONS

POTENTIAL MITIGATION STRATEGIES

The Action Plan was developed by the Committee by analyzing the existing Town programs and identifying proposed improvements and changes to these programs. Additional programs were also identified as potential mitigation strategies. The hazards that were defined in this plan were analyzed for potential mitigation opportunities using the New Hampshire's Hazard Mitigation Plan, other abutting community's hazard mitigation plans, and FEMA's Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards. Following this review and evaluation of potential mitigation strategies, the following hazards were identified as being critical for mitigation and therefore the committee included strategies pertinent to those listed below that the community will attempt to implement in a timely manner. These potential mitigation strategies were ranked in five categories according to how they accomplished each item: These potential mitigation strategies (Table 8) were ranked in five categories according to how they accomplished each item:

- Prevention
- Property Protection
- Structural Protection
- Emergency Services
- Public Information and Involvement

Table 8: Potential Mitigation Actions

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Description	Status 2015: New/Completed/ Deferred/ Removed
Acquire a backup generator for Ellis Elementary School	Prevention	All Hazards	Acquire a backup generator for the school so it may be used as an emergency shelter	Deferred due to lack of funds
Develop a Regional Emergency Shelter	Emergency Services	All Hazards	Coordinate with surrounding communities to establish and operate a regional emergency shelter	Completed – Sanborn Regional High School operates as a regional emergency shelter
Acquire a fixed generator for the EOC	Emergency Services	All Hazards	Acquire a fixed power generator for the EOC to remain fully operational during power outages	Completed
Develop an evacuation plan for the instance of a major disaster	Emergency Services	All Hazards	Develop an evacuation plan with town and regional emergency services personnel	Deferred due to lack of funds
Refine the early warning system to be incorporated within the cable access channel, town website and town newsletter	Public Information and Involvement Emergency Services	All Hazards	Develop and early warning system to inform residents about threats from natural hazards and ways to mitigate hazards	Completed – information is available on town website, cable access channel and town newsletter
Replace culverts on Beede Road at Rt. 107, Main Street at Louise Lane, Red Brook at Rt. 107, Sandown Road at Victoria Road	Prevention	Flooding	New culverts needed to improve drainage off of roadways	Completed – culverts at Louise Lane and Red Brook have been replaced Removed – culvert at Beede Road functioning properly Deferred – culvert at Sandown Road

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Description	Status 2015: New/Completed/ Deferred/ Removed
Elevating North Road	Prevention	Flooding	Elevate and re-center North Road to reduce flooding	Partially completed, work continuing
Reconstruct bridge at dam on Scribner Road	Prevention	Flooding	Bridge floods during heavy rain and spring snow melt	Removed – flash boards on dam taken out instead to reduce flooding
Repair Leavitt Road bridge, Martin Road bridge, Boggs bridge on Sandown Road	Prevention	Flooding	Bridges flood during heavy rain and spring snow melt	Completed – Leavitt Road bridge repair and Boggs bridge repair; Martin Road bridge repair going through state engineering review
Place river level gauge in Exeter River at Sandown Road bridge	Emergency Services/Prevention	Flooding	A river gauge could serve as a warning system during periods of heavy rain and snowmelt	Deferred due to lack of funds
Lightning safety mitigation plan	Public Information and Involvement/Prevention/Property Protection	Wildfire/Fire	Compile a lightning safety brochure that address how to prevent lightning strikes and take precautions during a lightning storm	Deferred due to lack of funds
Establish cooling and heating centers at the Safety Complex and Library	Emergency Services	Extreme Heat	Operate and publicize the availability of cooling and heating centers at the Safety Complex and Library during periods of extreme heat or power outages	New
Renovate Town Hall HVAC system so building can operate as a heating	Emergency Services	Extreme Heat	Renovations of the HVAC system in the Town Hall would enable the building to be used as a heating	New

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Description	Status 2015: New/Completed/ Deferred/ Removed
and cooling center			and cooling center during period of extreme heat or power outages	
Conduct an inventory of buildings, dams and bridges vulnerable to damage from earthquakes	Prevention	Earthquakes	Conduct and maintain an inventory of buildings and infrastructure that may be particularly vulnerable to earthquake damage, including historic structures	New
Conduct on-going inspection of roadways to identify hazardous trees and work with utility companies to remove trees	Prevention	Hurricane/Severe Winter Weather/Tornado	Road agent work survey trees along roadways to identify hazard trees and work with utility companies to remove trees	New
Incorporate wildfire mitigation actions such as vegetation management and water availability into municipal fire prevention programs	Prevention	Wildfire	Work with landowners to enable vegetation management and water availability in areas of town prone to wildfires	New
Provide residents with information on storm preparedness	Prevention Public Information and Involvement	All Hazards	Use the town website, town newsletter and cable access channel to educate residents on storm and hazard related mitigation and preparedness, including safe operation of home generators	New
Review and use the information collected on culverts in Fremont as part	Prevention	Flooding	The Rockingham Planning Commission completed an assessment of culverts in Fremont	New

Mitigation Strategies or Action	Mitigation Category	Hazard(s) Mitigated	Description	Status 2015: New/Completed/ Deferred/ Removed
of the Regional Stream Crossing Assessment developed by the Rockingham Planning Commission			in August 2015 using the NH Storm Crossing Assessment Protocol. Data from the assessment will be available in 2016.	

CHAPTER VIII – PRIORITIZATION OF MITIGATION ACTIONS

The goal of each strategy or action is reduction or prevention of damage from a hazard event. In order to determine their effectiveness in accomplishing this goal, a set of criteria was applied to each proposed strategy. A set of questions developed by the Committee that included the STAPLEE method was developed to rank the proposed mitigation actions. The STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies identified in Table 9:

- Does it reduce disaster damage?
- Does it contribute to other goals?
- Does it benefit the environment?
- Does it meet regulations?
- Will historic structures be saved or protected?
- Could it be implemented quickly?

STAPLEE criteria:

- **Social**: Is the proposed strategy socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical**: Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative**: Can the community implement the strategy? Is there someone to coordinate and lead the effort?
- **Political**: Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
- **Legal**: Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
- **Economic**: What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental**: How will the strategy impact the environment? Will the strategy need environmental regulatory approvals?

Each proposed mitigation strategy was evaluated using the above criteria and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation chart with total scores for each strategy can be found in the collection of individual tables under Tables 9.1 to 9.12.

Table 9.1: Acquire backup generator for Ellis School

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	1
Could it be implemented quickly?	1
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**28**

Table 9.2: Develop and evacuation plan

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	3
Does it benefit the environment?	1
Does it meet regulations?	2
Will historic structures be saved or protected?	1
Could it be implemented quickly?	1
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**27**

Table 9.3: Replace culvert on Sandown Road

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	2
Will historic structures be saved or protected?	2
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**35**

Table 9.4: Place river level gauge in Exeter River

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	2
Does it contribute to other goals?	2
Does it benefit the environment?	2
Does it meet regulations?	1
Will historic structures be saved or protected?	3
Could it be implemented quickly?	1
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	2
E: Is it Economically beneficial?	1
E: Are other Environmental approvals required?	1
Score	**25**

Table 9.5: Develop a lightning safety mitigation plan

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	2
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	2
Could it be implemented quickly?	1
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**30**

Table 9.6: Establish cooling and heating centers at the Safety Complex and Library

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	3
Will historic structures be saved or protected?	2
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	3
Score	**34**

Table 9.7: Renovate Town Hall HVAC

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	1
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**30**

Table 9.8 Inventory buildings and structures vulnerable to earthquake damage

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	1
Does it contribute to other goals?	2
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	1
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	3
Score	**30**

Table 9.9: On-going inspection of roadways for hazardous trees

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	2
Will historic structures be saved or protected?	2
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	2
Score	**35**

Table 9.10: Wildfire mitigation actions

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	2
Does it meet regulations?	2
Will historic structures be saved or protected?	1
Could it be implemented quickly?	1
S: Is it Socially acceptable?	2
T: Is it Technically feasible and potentially successful?	2
A: Is it Administratively workable?	2
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	2
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	2
Score	**27**

Table 9.11: Information for residents on storm preparedness

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	3
Will historic structures be saved or protected?	2
Could it be implemented quickly?	3
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	3
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	3
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	3
E: Are other Environmental approvals required?	3
Score	**38**

Table 9.12: Use stream crossing assessment information

Criteria	Evaluation Rating (1-3)
Does it reduce disaster damage?	3
Does it contribute to other goals?	3
Does it benefit the environment?	3
Does it meet regulations?	2
Will historic structures be saved or protected?	2
Could it be implemented quickly?	2
S: Is it Socially acceptable?	3
T: Is it Technically feasible and potentially successful?	2
A: Is it Administratively workable?	3
P: Is it Politically acceptable?	2
L: Is there Legal authority to implement?	3
E: Is it Economically beneficial?	2
E: Are other Environmental approvals required?	2
Score	**32**

CHAPTER IX – ACTION PLAN

This step involves developing an action plan that outlines who is responsible for implementing each of the prioritized strategies determined in the previous step, as well as when and how the actions will be implemented. The following questions were asked to develop an implementation schedule for the identified priority mitigation strategies:

WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

WHEN? When will these actions be implemented, and in what order?

Table 10 is the Action Plan. In addition to the prioritized mitigation projects, the Action Plan includes the responsible party (WHO), how the project will be supported (HOW), and what the timeframe is for implementation of the project (WHEN).

Table 10: Action Plan for proposed mitigation actions

Score	Project	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Timeframe
38	Provide residents with information on storm preparedness	EMD/Board of Selectmen	Town/HMAG	$500	Short Term One year or less
35	On-going inspection of roadways for identification and removal of hazardous trees	Road Agent/Utility Companies	Town/HMAG /Utility Companies	$2,500	Short Term One year of less
35	Replace culvert on Sandown Road	Road Agent	Town/HMAG	$10,000	Medium Term 2-3 years
34	Establish cooling and heating centers at Safety Complex and Library	EMD/Fire/Police/ Board of Selectmen	Town	None	Short Term One year or less
32	Use information collected on culverts as part of the Regional Stream Crossing Assessment	Road Agent	Town/HMAG	Unknown	Medium Term 2-3 years
30	Renovate Town Hall HVAC to create cooling and heating center	Board of Selectmen	Town	Unknown	Medium 2-3 years
30	Develop lightning safety mitigation plan	EMD	Town	$500	Medium 2-3 years
30	Inventory building and structures vulnerable to earthquake damage	EMD/Building Inspector	Town	$75/building or structure	Medium 2-3 years
29	Acquire a backup generator for Ellis School	Board of Selectmen/SAU	Town/HMAG	$20,000	Medium 2-3 years

Score	Project	Responsibility/ Oversight	Funding/ Support	Estimated Cost	Timeframe
27	Wildfire mitigation actions	Fire/EMD	Town/HMAG	$10,000	Medium Term 2-3 years
27	Develop an evacuation plan	EMD/Board of Selectmen/Fire/ Police	Town/EMPG	$3,000	Medium 2-3 years
25	Place gauge in Exeter River	EMD/Fire	State/Federal	Unknown	Long Term 4-5 years

CHAPTER X – INCORPORATING, MONITORING, EVALUATING AND UPDATING THE PLAN

Incorporating the Plan into Existing Planning Mechanisms

Upon review by FEMA and the State of New Hampshire, the Plan will be adopted by the Town and become an appendix to the Town's Emergency Operations Plan (EOP) when that plan is completed.

In the future, the Hazard Mitigation Plan Update 2015 will be consulted when the Town updates its Capital Improvement Program (CIP). The Capital Improvements Committee is responsible for updating the CIP annually, and will review the Action Plan, as it has done before, during each update. This committee in conjunction with Fremont Emergency Management will determine what items can and should be added to the CIP based on the Town's annual budget and possible sources of other funding. Portions of this plan should be referred to when updates to the towns Master Plan takes place. Considerations about future land use and proximity to current and potential hazard areas need to be inherently part of the planning process. NH RSA 674:2 III (e) gives towns the authority to include a natural hazards section, which documents the physical characteristics, severity, and extent of any potential natural hazards to the community, within the framework of a Master Plan.

Monitoring, Evaluating and Updating the Plan

Recognizing that many mitigation projects are continual, and that while in the implementation stage communities may suffer budget cuts, experience staff turnover, or projects may fail altogether, a good plan needs to provide for periodic monitoring and evaluation of its successes and failures and allow for updates of the Plan where necessary.

In order to track progress and update the Mitigation Strategies identified in the Action Plan (Table 10), it is recommended that the Town revisit the Plan annually, or after a hazard event. If it is not realistic or appropriate to revise the Plan every year, then the Plan will be revisited no less than every five years per FEMA requirements. The Emergency Management Director is responsible for initiating this review with members of the Town that are appropriate including members of the public. In keeping with the process of adopting the 2014 Plan Update and per NH RSA 91-A:2 (II) and pursuant to CFR 201.6(b)(1) regarding notice requirements, a public meeting to receive public comment on Plan maintenance and updating will be held during any review of the Plan. This publicly noticed meeting (via town website, and postings in the town office, library, or local newspaper) will allow for members of the community not involved in developing the Plan to provide input and comments each time the Plan is revised. The final revised Plan will be adopted by the Board of Selectmen appropriately, at a second publicly noticed meeting.

Changes should be made to the Plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this Plan to determine feasibility of future implementation.

APPENDIX A:
SUMMARY OF HAZARD MITIGATION STRATEGIES

I. RIVERINE MITIGATION

A. PREVENTION - Prevention measures are intended to keep the problem from occurring in the first place, and/or keep it from getting worse. Future development should not increase flood damage. Building, zoning, planning, and/or code enforcement officials usually administer preventative measures.

1. Planning and Zoning - Land use plans are put in place to guide future development, recommending where - and where not - development should occur. Sensitive and vulnerable lands can be designated for uses that would not be incompatible with occasional flood events - such as parks or wildlife refuges. A Capital Improvements Program can recommend the setting aside of funds for public acquisition of these designated lands. The zoning ordinance can regulate development in these sensitive areas by limiting or preventing some or all development - for example, by designating floodplain overlay, conservation, or agricultural districts.

2. Open Space Preservation - Preserving open space is the best way to prevent flooding and flood damage. Open space preservation should not, however, be limited to the flood plain, since other areas within the watershed may contribute to controlling the runoff that exacerbates flooding. Land Use and Capital Improvement Plans should identify areas to be preserved by acquisition and other means, such as purchasing easements. Aside from outright purchase, open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for flood flow, drainage and storage.

3. Floodplain Development Regulations - Floodplain development regulations typically do not prohibit development in the special flood hazard area, but they do impose construction standards on what is built there. The intent is to protect roads and structures from flood damage and to prevent the development from aggravating the flood potential. Floodplain development regulations are generally incorporated into subdivision regulations, building codes, and floodplain ordinances, which either stand-alone or are contained within a zoning ordinance.

Subdivision Regulations: These regulations govern how land will be divided into separate lots or sites. They should require that any flood hazard areas be shown on the plat, and that every lot has a buildable area that is above the base flood elevation.

Building Codes: Standards can be incorporated into building codes that address flood proofing for all new and improved or repaired buildings.

Floodplain Ordinances: Communities that participate in the National Flood Insurance Program are required to adopt the minimum floodplain management regulations, as developed by FEMA. The regulations set minimum standards for subdivision regulations and building codes. Communities may adopt more stringent standards than those set forth by FEMA.

4. Stormwater Management - Development outside of a floodplain can contribute significantly to flooding by covering impervious surfaces, which increases storm water runoff. Storm water management is usually addressed in subdivision regulations. Developers are typically required to build retention or detention basins to minimize any increase in runoff caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water

leaving the site at a rate higher than it did before the development. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures must be employed for storm water infiltration - for example, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks.

5. Drainage System Maintenance - Ongoing maintenance of channel and detention basins is necessary if these facilities are to function effectively and efficiently over time. A maintenance program should include regulations that prevent dumping in or altering watercourses or storage basins; regrading and filling should also be regulated. Any maintenance program should include a public education component, so that the public becomes aware of the reasons for the regulations. Many people do not realize the consequences of filling in a ditch or wetland, or regrading their yard without concern for runoff patterns.

B. PROPERTY PROTECTION - Property protection measures are used to modify buildings subject to flood damage, rather than to keep floodwaters away. These may be less expensive to implement, as they are often carried out on a cost-sharing basis. In addition, many of these measures do not affect a building's appearance or use, which makes them particularly suitable for historical sites and landmarks.

1. Relocation - Moving structures out of the floodplain is the surest and safest way to protect against damage. Relocation is expensive, however, so this approach will probably not be used except in extreme circumstances. Communities that have areas subject to severe storm surges, ice jams, etc. might want to consider establishing a relocation program, incorporating available assistance.

2. Acquisition - Acquisition by a governmental entity of land in a floodplain serves two main purposes: (1) it ensures that the problem of structures in the floodplain will be addressed; and (2) it has the potential to convert problem areas into community assets, with accompanying environmental benefits. Acquisition is more cost effective than relocation in those areas that are subject to storm surges, ice jams, or flash flooding. Acquisition, followed by demolition, is the most appropriate strategy for those buildings that are simply too expensive to move, as well as for dilapidated structures that are not worth saving or protecting. Relocation can be expensive; however, there are government grants and loans that can be applied toward such efforts.

3. Building Elevation - Elevating a building above the base flood elevation is the best on-site protection strategy. The building could be raised to allow water to run underneath it, or fill could be brought in to elevate the site on which the building sits. This approach is cheaper than relocation, and tends to be less disruptive to a neighborhood. Elevation is required by law for new and substantially improved residences in a floodplain, and is commonly practiced in flood hazard areas nationwide.

4. Floodproofing - If a building cannot be relocated or elevated, it may be floodproofed. This approach works well in areas of low flood threat. Flood proofing can be accomplished through barriers to flooding, or by treatment to the structure itself.

Barriers: Levees, floodwalls and berms can keep floodwaters from reaching a building. These are useful, however, only in areas subject to shallow flooding.

Dry Flood proofing: This method seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such doors, windows, etc. are closed either permanently with removable shields or with sandbags.

Wet Flood proofing: This technique is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. Approaches range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.

5. Sewer Backup Protection - Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Other protections include:

- Floor drain plugs and floor drain standpipe, which keep water from flowing out of the lowest opening in the house.

- Overhead sewer - keeps water in the sewer line during a backup.

- Backup valve - allows sewage to flow out while preventing backups from flowing into the house.

6. Insurance - Above and beyond standard homeowner insurance, there is other coverage a homeowner can purchase to protect against flood hazard. Two of the most common are National Flood Insurance and basement backup insurance.

National Flood Insurance: When a community participates in the National Flood Insurance Program, any local insurance agent is able to sell separate flood insurance policies under rules and rates set by FEMA. Rates do not change after claims are paid because they are set on a national basis.

Basement Backup Insurance: National Flood Insurance offers an additional deductible for seepage and sewer backup, provided there is a general condition of flooding in the area that was the proximate cause of the basement getting wet. Most exclude damage from surface flooding that would be covered by the NFIP.

C. NATURAL RESOURCE PROTECTION - Preserving or restoring natural areas or the natural functions of floodplain and watershed areas provide the benefits of eliminating or minimizing losses from floods, as well as improve water quality and wildlife habitats. Parks, recreation, or conservation agencies usually implement such activities. Protection can also be provided through various zoning measures that are specifically designed to protect natural resources.

1. Wetlands Protection Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. In New Hampshire, the N.H. Wetlands Board must

approve any project that impacts a wetland. And, many communities in New Hampshire also have local wetland ordinances. Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development. This is not an ideal practice, however, since it takes many years for a new wetland to achieve the same level of quality as an existing one.

2. Erosion and Sedimentation Control - Controlling erosion and sediment runoff during construction and on farmland is important, since eroding soil will typically end up in downstream waterways. And, because sediment tends to settle where the water flow is slower, it will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters. Practices to reduce erosion and sedimentation have two principal components: (1) minimize erosion with vegetation and; (2) capture sediment before it leaves the site. Slowing the runoff increases infiltration into the soil, thereby controlling the loss of topsoil from erosion and the resulting sedimentation. Runoff can be slowed by vegetation, terraces, contour strip farming, no-till farm practices, and impoundments (such as sediment basins, farm ponds, and wetlands).

3. Best Management Practices - Best Management Practices (BMPs) are measures that reduce nonpoint source pollutants that enter waterways. Nonpoint source pollutants are carried by storm water to waterways, and include such things as lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial sites. BMPs can be incorporated into many aspects of new developments and ongoing land use practices. In New Hampshire, the Department of Environmental Services has developed best management practices for a range of activities, from farming to earth excavations.

D. EMERGENCY SERVICES - Emergency services protect people during and after a flood. Many communities in New Hampshire have emergency management programs in place, administered by an emergency management director (very often the local police or fire chief).

1. Flood Warning - On large rivers, the National Weather Service handles early recognition. Communities on smaller rivers must develop their own warning systems. Warnings may be disseminated in a variety of ways, such as sirens, radio, television, mobile public address systems, or door-to-door contact. It seems that multiple or redundant systems are the most effective, giving people more than one opportunity to be warned.

2. Flood Response - Flood response refers to actions that are designed to prevent or reduce damage or injury, once a flood threat is recognized. Such actions and the appropriate parties include:

- activating the emergency operations center (emergency director)
- sandbagging designated areas (public works department)
- closing streets and bridges (police department)
- shutting off power to threatened areas (public service)
- releasing children from school (school district)
- ordering an evacuation (selectmen/city council/emergency director)
- opening evacuation shelters (churches, schools, Red Cross, municipal facilities)

These actions should be part of a flood response plan, which should be developed in coordination with the persons and agencies that share the responsibilities. Drills and exercises should be conducted so that the key participants know what they are supposed to do.

3. Critical Facilities Protection - Protecting critical facilities is vital, since expending efforts on these facilities can draw workers and resources away from protecting other parts of town. Buildings or locations vital to the flood response effort:

- emergency operations centers
- police and fire stations
- hospitals
- highway garages
- selected roads and bridges
- evacuation routes
- Buildings or locations that, if flooded, would create secondary disasters
- hazardous materials facilities
- water/wastewater treatment plants
- schools
- nursing homes

All such facilities should have their own flood response plan that is coordinated with the community's plan. Nursing homes, other public health facilities, and schools will typically be required by the state to have emergency response plans in place.

4. Health and Safety Maintenance - The flood response plan should identify appropriate measures to prevent danger to health and safety. Such measures include:

- patrolling evacuated areas to prevent looting.
- providing safe drinking water.
- vaccinating residents for tetanus.
- clearing streets.
- cleaning up debris.

The plan should also identify which agencies will be responsible for carrying out the identified measures. A public information program can be helpful to educate residents on the benefits of taking health and safety precautions.

Structural Projects - Structural projects are used to prevent floodwaters from reaching properties. These are all man-made structures, and can be grouped into the six types of discussed below. The shortcomings of structural approaches are that:

- They can be very expensive.
- They disturb the land, disrupt natural water flows, and destroy natural habitats.
- They are built to an anticipated flood event, and may be exceeded by a greater-than-expected flood.
- They can create a false sense of security.

Reservoirs - Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle.

Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs:

- are expensive;
- occupy a lot of land;
- require periodic maintenance;
- may fail to prevent damage from floods that exceed their design levels; and
- may eliminate the natural and beneficial functions of the floodplain.

Reservoirs should only be used after a thorough watershed analysis that identifies the most appropriate location, and ensures that they would not cause flooding somewhere else. Because they are so expensive and usually involve more than one community, they are typically implemented with the help of state or federal agencies, such as the Army Corps of Engineers.

Levees/Floodwalls - Probably the best know structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land. If space is a consideration, floodwalls are typically used, since levees need more space. Levees and floodwalls should be set back out of the floodway, so that they will not divert floodwater onto other properties.

Diversions - A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving lake or river.

Diversions are limited by topography; they won't work everywhere. Unless the receiving water body is relatively close to the flood prone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed. In either case, care must be taken to ensure that the diversion does not create a flooding problem somewhere else.

Channel Modifications - Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but, as with other techniques mentioned, it is important to ensure that the modifications do not create or increase a flooding problem downstream.

Dredging: Dredging is often cost-prohibitive because the dredged material must be disposed of somewhere else, and the stream will usually fill back in with sediment. Dredging is usually undertaken only on larger rivers, and then only to maintain a navigation channel.

Drainage modifications: These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more

attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.

Storm Sewers - Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding.

In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.

Public Information - Public information activities are intended to advise property owners, potential property owners, and visitors about the particular hazards associated with a property, ways to protect people and property from these hazards, and the natural and beneficial functions of a floodplain.

1. **Map Information -** Flood maps developed by FEMA outline the boundaries of the flood hazard areas. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. These maps are available from FEMA, the NH Office of Emergency Management, the NH Office of State Planning, or your regional planning commission.

Outreach Projects - Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Examples of outreach activities include:

- Mass mailings or newsletters to all residents.
- Notices directed to floodplain residents.
- Displays in public buildings, malls, etc.
- Newspaper articles and special sections.
- Radio and TV news releases and interview shows.
- A local flood proofing video for cable TV programs and to loan to organizations.
- A detailed property owner handbook tailored for local conditions.
- Presentations at meetings of neighborhood groups.

Research has shown that outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Research also shows that locally designed and run programs are much more effective than national advertising.

Real Estate Disclosure - Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only five days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.

Library - Your local library can serve as a repository for pertinent information on flooding and flood protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in flood mitigation.

Technical Assistance - Certain types of technical assistance are available from the NFIP Coordinator, FEMA, and the Natural Resources Conservation District. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners. An example of technical assistance is the flood audit, in which a specialist visits a property. Following the visit, the owner is provided with a written report, detailing the past and potential flood depths, and recommending alternative protection measures.

Environmental Education - Education can be a great mitigating tool, if people can learn what not to do before damage occurs. And the sooner the education begins, the better. Environmental education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river. Education programs do not have to be limited to children. Adults can benefit from knowledge of flooding and mitigation measures. And decision-makers, armed with this knowledge, can make a difference in their communities.

II. EARTHQUAKES

A. PREVENTIVE - Planning/zoning to keep critical facilities away from fault lines.
Planning, zoning and building codes to avoid areas below steep slopes or soils subject to liquefaction.
Building codes to prohibit loose masonry, overhangs, etc.

B. PROPERTY PROTECTION:
Acquire and clear hazard areas.
Retrofitting to add braces, remove overhangs.
Apply mylar to windows and glass surfaces to protect from shattering glass.
Tie down major appliances, provide flexible utility connections.
Earthquake insurance riders.

C. EMERGENCY SERVICES - Earthquake response plans to account for secondary problems, such as fires and hazardous materials spills.

D. EMERGENCY SERVICES - Slope stabilization.

III. DAM FAILURE

A. PREVENTIVE:
Dam failure inundation maps.
Planning/zoning/open space preservation to keep area clear.
Building codes with flood elevation based on dam failure.
Dam safety inspections.
Draining the reservoir when conditions appear unsafe.

B. PROPERTY PROTECTION - Acquisition of buildings in the path of a dam breach flood. Flood insurance.

C. EMERGENCY SERVICES - Dam conditioning monitoring; warning and evacuation plans based on dam failure.

D. EMERGENCY SERVICES - Dam improvements, spillway enlargements. Remove unsafe dams.

IV. WILDFIRES

A. PREVENTIVE:

Zoning districts to reflect fire risk zones.
Planning and zoning to restrict development in areas near fire protection and water resources.
Requiring new subdivisions to space buildings, provide firebreaks, on-site water storage, wide roads multiple accesses.
Building code standards for roof materials, spark arrestors.
Maintenance programs to clear dead and dry bush, trees.
Regulation on open fires.

B. PROPERTY PROTECTION:

Retrofitting of roofs and adding spark arrestors.
Landscaping to keep bushes and trees away from structures.
Insurance rates based on distance from fire protection.

C. NATURAL RESOURCE PROTECTION - Prohibit development in high-risk areas.

D. EMERGENCY SERVICES - Fire Fighting

V. WINTER STORMS

A. PREVENTIVE - Building code standards for light frame construction, especially for wind-resistant roofs.

B. PROPERTY PROTECTION:

Storm shutters and windows
Hurricane straps on roofs and overhangs
Seal outside and inside of storm windows and check steals in spring and fall.
Family and/or company severe weather action plan & drills:
include a NOAA weather radio
designate a shelter area or location
keep a disaster supply kit, including stored food and water
keep snow removal equipment in good repair; have extra shovels, sand, rock, salt and gas
know how to turn off water, gas, and electricity at home or work

C. NATURAL RESOURCE PROTECTION - Maintenance program for trimming tree and shrubs

D. EMERGENCY SERVICES - Early warning systems/NOAA Weather Radio Evacuation Plans

APPENDIX B:
TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

Local Municipalities must have a FEMA-approved Hazard Mitigation Plan in order to be eligible for the Hazard Mitigation Grant Program (for a disaster declared after November 1st, 2004) and the Pre-disaster Mitigation Project Grants. Information on these two Grant Programs is listed below. Additional hazard mitigation grant program information follows.

HAZARDS MITIGATION GRANT PROGRAM (HGMP) - Authorized under Section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.
Hazard Mitigation Grant Program funding is only available in States following a Presidential disaster declaration. Eligible applicants are:

- State and local governments
- Indian tribes or other tribal organizations
- Certain private non-profit organization

Individual homeowners and businesses may not apply directly to the program; however a community may apply on their behalf. HMGP funds may be used to fund projects that will reduce or eliminate the losses from future disasters. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage.

PRE-DISASTER MITIGATION PROGRAM - The Pre-Disaster Mitigation (PDM) program provides technical and financial assistance to States and local governments for cost-effective pre-disaster hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property. FEMA provides grants to States and Federally recognized Indian tribal governments that, in turn, provide sub-grants to local governments (to include Indian Tribal governments) for mitigation activities such as planning and the implementation of projects identified through the evaluation of natural hazards.

ADDITIONAL HAZARD MITIGATION GRANT PROGRAMS:

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM - FEMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical

Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures. Additional information can be read on the Mitigation Planning pages.

Funding for the program is provided through the National Flood Insurance Fund, and FMA is funded at $20 million nationally.
States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encourages States and communities to address target repetitive loss properties identified in the Agency's Repetitive Loss Strategy. These include structures with four or more losses, and structures with 2 or more losses where cumulative payments have exceeded the property value. State and communities are also encouraged to develop Plans that address the mitigation of these target repetitive loss properties.

BEM EMERGENCY MANAGEMENT ASSISTANCE PROGRAM
GUIDELINES - Emergency Management Assistance (EMA) funding is available to local communities and eligible Agencies for projects that fall in FOUR general areas of Emergency Management: Planning activities; Training activities; Drills and Exercises; and Emergency Management Administration. Contact your New Hampshire Bureau of Emergency Management (BEM) local Field Representative for additional information and an APPLICATION PACKET.
The following list of possible projects and activities is meant to guide you in selecting projects for an EMA Grant Submission. This list of suggested projects is not intended to be all-inclusive. Local communities or agencies may have other specific projects and activities that reflect local needs based on local capability assessments and local hazards.

Planning Activities may include:

- Develop a Hazard Mitigation Plan for your community.
- Prepare a hazard mitigation project proposal for submission to BEM.
- Create, revise, or update Dam Emergency Action plans.
- Update your local Emergency Operations Plan (EOP). Consider updating a number of specific annexes each year to ensure that the entire plan is updated at least every four years.
- If applicable, develop or incorporate a regional HazMat Team Annex into your EOP.
- Develop an Anti-Terrorism Annex into your EOP.
- Develop a local/regional Debris Management Annex into your EOP.
- Develop and maintain pre-scripted requests for additional assistance (from local area public works, regional mutual aid, State resources, etc.) and local declarations of emergency.
- Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.
- Develop and maintain a list of private non-profit organizations within your local jurisdiction to ensure that these organizations are included in requests for public assistance funds.
- Prepare a submission for nomination as a “Project Impact” Community.

Training Activities may include:

- Staff members attend training courses at the Emergency Management Institute.
- Staff members attend a “field delivered” training course conducted by BEM.
- Staff members attend other local, State, or nationally sponsored training event, which provides skills or knowledge relevant to emergency management.

- Staff members complete one or more FEMA Independent Study Courses.
- Identify and train a pre-identified local damage assessment team.

Drills and Exercises might include:

- Conduct multi-agency EOC Exercise (Tabletop or Functional) and forward an Exercise Evaluation Report, including after action reports, to BEM (external evaluation of exercises is strongly encouraged). Drills or Exercises might involve any of the following scenarios:
    - Hurricane Exercise
    - Terrorism Exercise
    - Severe Storm Exercise
    - Communications Exercise
    - Mass Causality Exercise involving air, rail, or ship transportation accident
- Participate in multi-State or multi-Jurisdictional Exercise and forward Exercise Report to BEM.
- HazMat Exercise with Regional HazMat Teams
- BEM Communications Exercises
- Observe or evaluate State or local exercise outside your local jurisdiction.
- Assist local agencies and commercial enterprises (nursing homes, dams, prisons, schools, etc.) in developing, executing, and evaluating their exercise.
- Assist local hospitals in developing, executing and evaluating Mass Care, HazMat, Terrorism, and Special Events Exercises.
- Administrative Projects and Activities may include:
- Maintain an Emergency Operations Center (EOC) and alternate EOC capable of accommodating staff to respond to local emergencies.
- Establish and maintain a Call-Down List for EOC staff.
- Establish and maintain Emergency Response/Recovery Resource Lists.
- Develop or Update Emergency Management Mutual Aid Agreements with a focus on Damage Assessment, Debris Removal, and Resource Management.
- Develop and maintain written duties and responsibilities for EOC staff positions and agency representatives.
- Develop or Update Procedures for tracking of disaster-related expenses by local agencies.

FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM - FMA was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA regulations can be found in 44 CFR Part 78. Funding for the program is provided through the National Flood Insurance Fund. FMA is funded at $20 million nationally. FMA provides funding to assist States and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

There are three types of grants available under FMA: Planning, Project, and Technical Assistance Grants. FMA Planning Grants are available to States and communities to prepare Flood Mitigation Plans. NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project Grants. FMA Project Grants are available to States and NFIP participating communities to implement measures to reduce flood losses. Ten percent of the Project Grant is made available to States as a Technical Assistance Grant. These funds may be used by the State to help administer the program. Communities receiving FMA Planning and Project Grants must be participating in the NFIP. A few examples of eligible FMA projects include: the elevation, acquisition, and relocation of NFIP-insured structures.

States are encouraged to prioritize FMA project grant applications that include repetitive loss properties. The FY 2001 FMA emphasis encourages States and communities to address target repetitive loss properties identified in the Agency's Repetitive Loss Strategy. These include structures with four or more losses, and structures with 2 or more losses where cumulative payments have exceeded the property value. State and communities are also encouraged to develop Plans that address the mitigation of these target repetitive loss properties.

APPENDIX C:
SAFFIR/SIMPSON HURRICANE SCALE

Courtesy of National Hurricane Center

This can be used to give an estimate of the potential property damage and flooding expected along the coast with a hurricane.

Category	Definition	Effects
One	Winds 74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage
Two	Winds 96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of center. Small craft in unprotected anchorages break moorings.
Three	Winds 111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain continuously lower than 5 feet ASL may be flooded inland 8 miles or more.
Four	Winds 131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore. Terrain continuously lower than 10 feet ASL may be flooded requiring massive evacuation of residential areas inland as far as 6 miles.
Five	Winds greater than 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located less than 15 feet ASL and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5 to 10 miles of the shoreline may be required.

Above information can be found at: http://www.fema.gov/hazards/hurricanes/saffir.shtm

APPENDIX D:
FUJITA TORNADO DAMAGE SCALE

Developed in 1971 by T. Theodore Fujita of the University of Chicago

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

*** IMPORTANT NOTE ABOUT F-SCALE WINDS: Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.

Information depicted above can be found at: http://www.spc.noaa.gov/faq/tornado/f-scale.html

APPENDIX E:
THE RICHTER MAGNITUDE SCALE

Earthquake Severity

Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Information above found at: http://www.seismo.unr.edu/ftp/pub/louie/class/100/magnitude.html

The Richter Magnitude Scale - Seismic waves are the vibrations from earthquakes that travel through the Earth; they are recorded on instruments called seismographs. Seismographs record a zig-zag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs, which greatly magnify these ground motions, can detect strong earthquakes from sources anywhere in the world. The time, locations, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Earthquakes with magnitude of about 2.0 or less are usually call microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater - there are several thousand such shocks annually - are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes, such as the 1964 Good Friday earthquake in Alaska, have magnitudes of 8.0 or higher. On the average, one earthquake of such size occurs somewhere in the world each year. The Richter Scale has no upper limit. Recently, another scale called the moment magnitude scale has been devised for more precise study of great earthquakes. The Richter Scale is not used to express damage. An earthquake in a densely populated area which results in many deaths and considerable damage may have the same magnitude as a shock in a remote area that does nothing more than frighten wildlife. Large-magnitude earthquakes that occur beneath the oceans may not even be felt by humans.

Extreme Weather Madness
Thunderstorm Criteria

THUNDERSTORM TYPES	Rainfall Rate/hr	MAX WIND GUST	HAIL SIZE	PEAK TORNADO Possibility	LIGHTNING FREQUENCY (5 min Intervals)	Darkness Factor	STORM IMPACT
T-1 – Weak thunderstorms or Thundershowers	.03-.10	< 25 MPH	None	None	Only a few strikes during the storm.	Slightly Dark. Sunlight may be seen under the storm.	1. No damage. 2. Gusty winds at times.
T-2 – Moderate Thunderstorms.	.10"-.25"	25-40 MPH	None	None	Occasional 1-10	Moderately Dark. Heavy downpours may cause the need for car lights.	1. Heavy downpours. 2. Occasional lightning. 3. Gusty winds. 4. Very little damage. 5. Small tree branches may break 6. Lawn furniture moved around
T-3 – Heavy Thunderstorms 1. Singular or lines of storms.	.25"-.55"	40-57 MPH	1/4 " to ¾"	EF0	Occasional to Frequent 10-20	Dark. Car lights used. Visibility low in heavy rains. Cars may pull off the road.	1. Minor Damage. 2. Downpours that produce some flooding on streets. 3. Frequent lightning could cause house fires. 4. Hail occurs within the downpours. 5. Small branches are broken. 6. Shingles are blown off roofs.
T-4 – Intense Thunderstorms 1. Weaker supercells 2. Bow Echos or lines of Storms	.55" – 1.25"	58 to 70 MPH	1" to 1.5"	EF0 to EF2	Frequent 20-30	Very Dark. Car lights used. Some street lights come on..	1. Moderate Damage. 2. Heavy rains can cause flooding to streams and creeks. Roadway flooding. 3. Hail can cause dents on cars and cause crop damage. 3. Wind damage to trees and buildings. 4. Tornado damage. 5. Power outages
T-5 – Extreme Thunderstorms 1. Supercells with familty of tornadoes. 2. Derecho Windstorms	1.25" – 4"	Over 70 Mph	Over 1.5" to 4"	EF3 to EF5	Frequent to Continuous. > 30	Pitch Black, Street Lights come on. House lights maybe used	1. Severe Damage to Trees and Property. Damage is widespread. 2. Flooding rains. 3. Damaging hail. 4. Damaging wind gusts to trees and buildings. 5. Tornadoes F3-F5 or family of tornadoes can occur. Tornadoes can cause total devastation. 6. Widespread power outages.

Appendix G
Lightning Risk Definitions

Lightning Risk Definitions	
Low Risk	Thunderstorms are only expected to be isolated or widely scattered in coverage (20 Percent Chance). Atmospheric conditions do not support frequent cloud-to-ground lightning strikes.
Moderate Risk	Thunderstorms are forecast to be scattered in coverage (30-50 Percent Chance). Atmospheric conditions support frequent cloud-to-ground lightning strikes.
High Risk	Thunderstorms are forecast to be numerous or widespread in coverage (60-100 Percent Chance). Atmospheric conditions support continuous and intense cloud-to-ground lightning strikes.

Appendix H

Hail Size Description Chart

Hail Size Description Chart

Hailstone size	Measurement	
	in.	cm.
bb	< 1/4	< 0.64
pea	1/4	0.64
dime	7/10	1.8
penny	3/4	1.9
nickel	7/8	2.2
quarter	1	2.5
half dollar	1 1/4	3.2
golf ball	1 3/4	4.4
billiard ball	2 1/8	5.4
tennis ball	2 1/2	6.4
baseball	2 3/4	7.0
softball	3.8	9.7
Compact disc / DVD	4 3/4	12.1

Note: Hail size refers to the diameter of the hailstone.

Appendix I

Sperry-Pitz Ice Accumulation Index

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Appendix J

Wildland Urban Interface (WUI) Exposure Zones – NIST Technical Note 1748, January 2013
Source: National Institute of Standards and Technology (NIST), US Dept. of Commerce

Table 4: E-Scale Building Construction Classes and Attributes

WUI scale	Building Construction Class	Ignition Vulnerabilities from Embers and Fire	Building Construction and Landscaping Attributes for Protection against Embers
E1 or F1	WUI 1	None	Normal Construction Requirements: - Maintained Landscaping - Local AHJ-Approved Access for firefighting equipment
E2 or F2	WUI 2	In this area, highly volatile fuels could be ignited by embers. Weathered, dry combustibles with large surface areas can become targets for ignition fro m embers.	Low Construction Hardening Requirements: - Treated combustibles allowed on structure - Attached treated combustibles allowed - Treated combustibles allowed around structure - Low flammability plants - Irrigated and well maintained Landscaping - Local AHJ-Approved Access for firefighting equipment
E3 or F3	WUI 3	Exposed combustibles are likely to ignite in this area from high ember flux or high heat flux	Intermediate Construction Hardening Requirements: - No exposed combustibles on structure - Combustibles placed well away from structure - Low flammability plants - Irrigated and well maintained landscaping - Local AHJ-Approved Access for firefighting equipment
E4 or F4	WUI 4	Ignition of combustibles from direct flame contact is likely.	High Construction Hardening Requirements: - No exposed combustibles - All vents, opening must be closed - Windows and doors must be covered with insulated non-combustible coverings. - Irrigated and well maintained low flammability landscaping - Local AHJ-Approved Access for firefighting equipment

Appendix K
Documentation of Planning Process

Natural Hazards Mitiation Plan Meeting #1
Fremont Town Hall
Fremont, NH

Meeting Agenda

1. **Welcome and Introduction**
   - Review of Hazard Mitigation Goals and Objectives
   - Review of Current Plan

2. **Identify Hazards and conduct Risk Analysis**
   - What are the hazards? – Past and potential
   - What is at risk from those hazards?

3. **Develop Base Map with Critical Facilities (Step 2)**
   - Identify Critical Facilities on a Base Map.

4. **Vulnerability Assessment (Step 3)**
   - List hazards from hazards map - identify what is at risk/vulnerable
   - Estimate potential losses

5. **Capability Assessment (Step 5)**
   - Identify Existing Mitigation Strategies
   - Consider New Strategies

6. **Questions and Answers**

7. **Set Goals for Next Meeting**

Fremont Hazard Mitigation Committee
Meetings #2, #3 and #4
Natural Hazards Mitigation Plan Update Meeting
Fremont Town Hall

1. **Welcome and Introduction**

2. **Capability Assessment (Step 6A)**
   - Review Critical Facilities/Past and Potential Hazards Map
   - Identify Existing Mitigation Strategies/Projects
   - Identify New Mitigation Strategies/Projects
   - Review and update Plan Maps
3. **Evaluate Each Strategy/Project (Step 6B)**

   - Using the STAPLEE METHOD.

4. **Prioritize Proposed Mitigation Strategies (Step 7)**

- Does the action reduce damage?
- Does the action contribute to community objectives?
- Does the action meet existing regulations?
- Does the action protect historic structures?
- Can the action be implemented quickly?

5. Establish an implementation strategy for each new mitigation Strategy defining the following three questions (Step 8)

- Who will lead the effort?
- How will it be implemented? *(Technical and Financial resources)*
- When will it take place?

6. Discuss Monitoring, Updating and Adoption of Plan

Notice of Public Hearing on Draft Plan

To be added

Appendix L
Approval Letters from FEMA